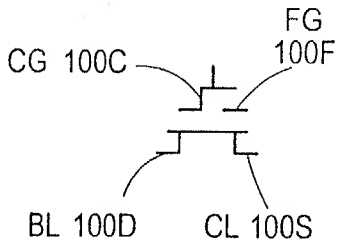
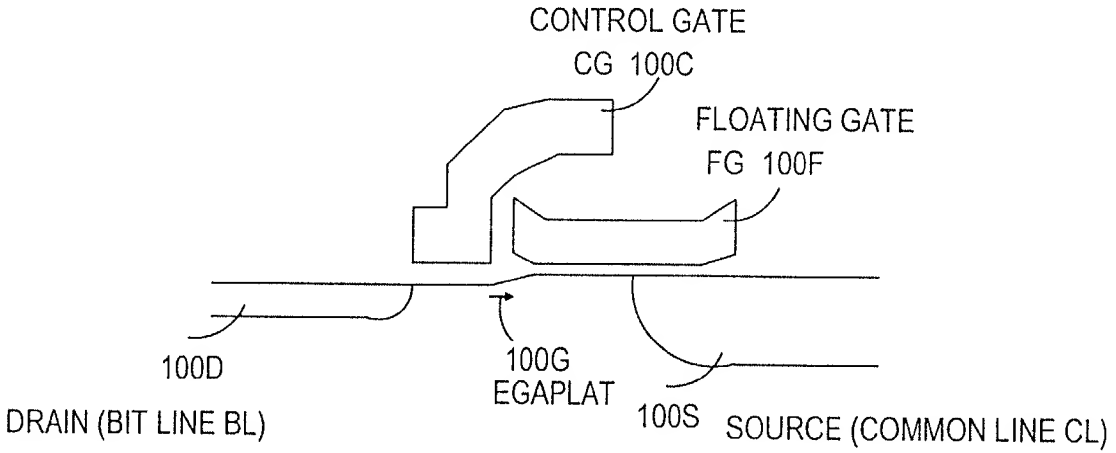
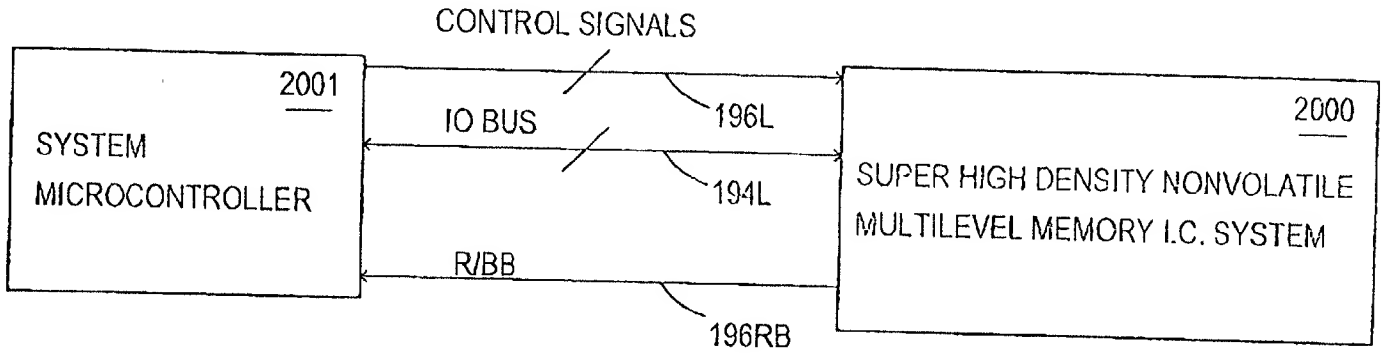


FIGURE 1B



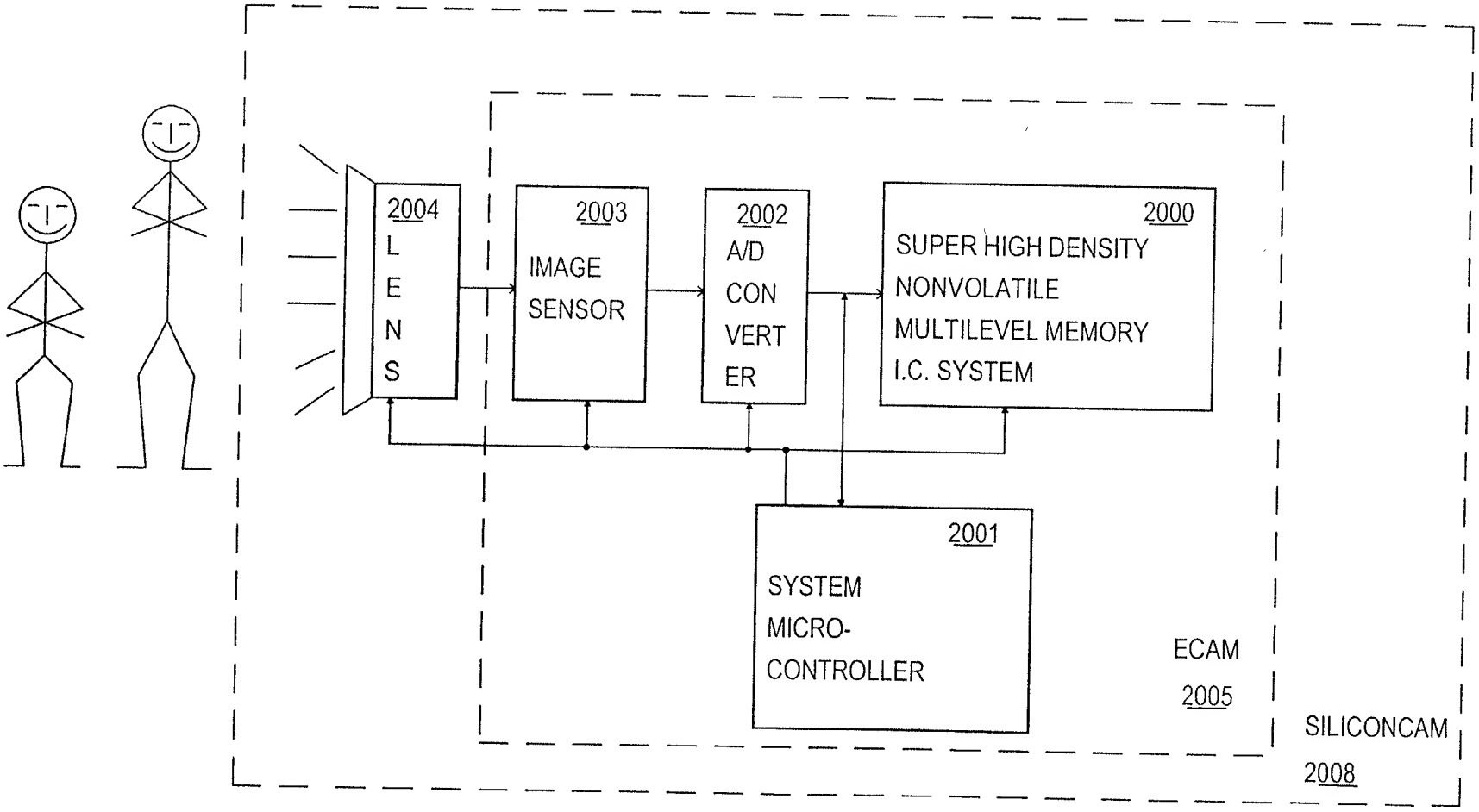
SOURCE SIDE INJECTION FLASH MEMORY CELL: CROSS SECTION ALONG THE BIT LINE

FIGURE 1A



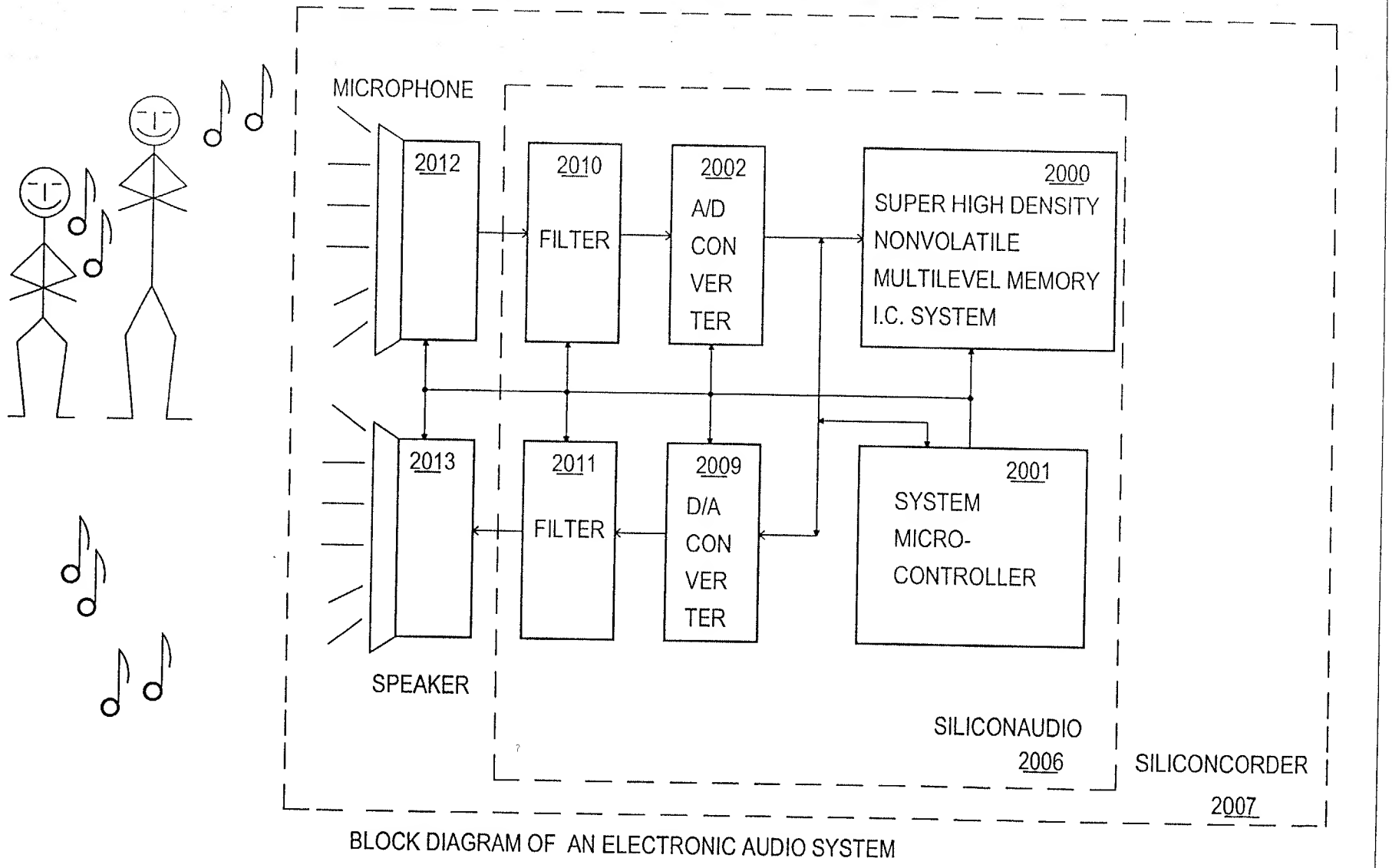
BLOCK DIAGRAM OF A NONVOLATILE MULTILEVEL MEMORY SYSTEM

FIGURE 1C



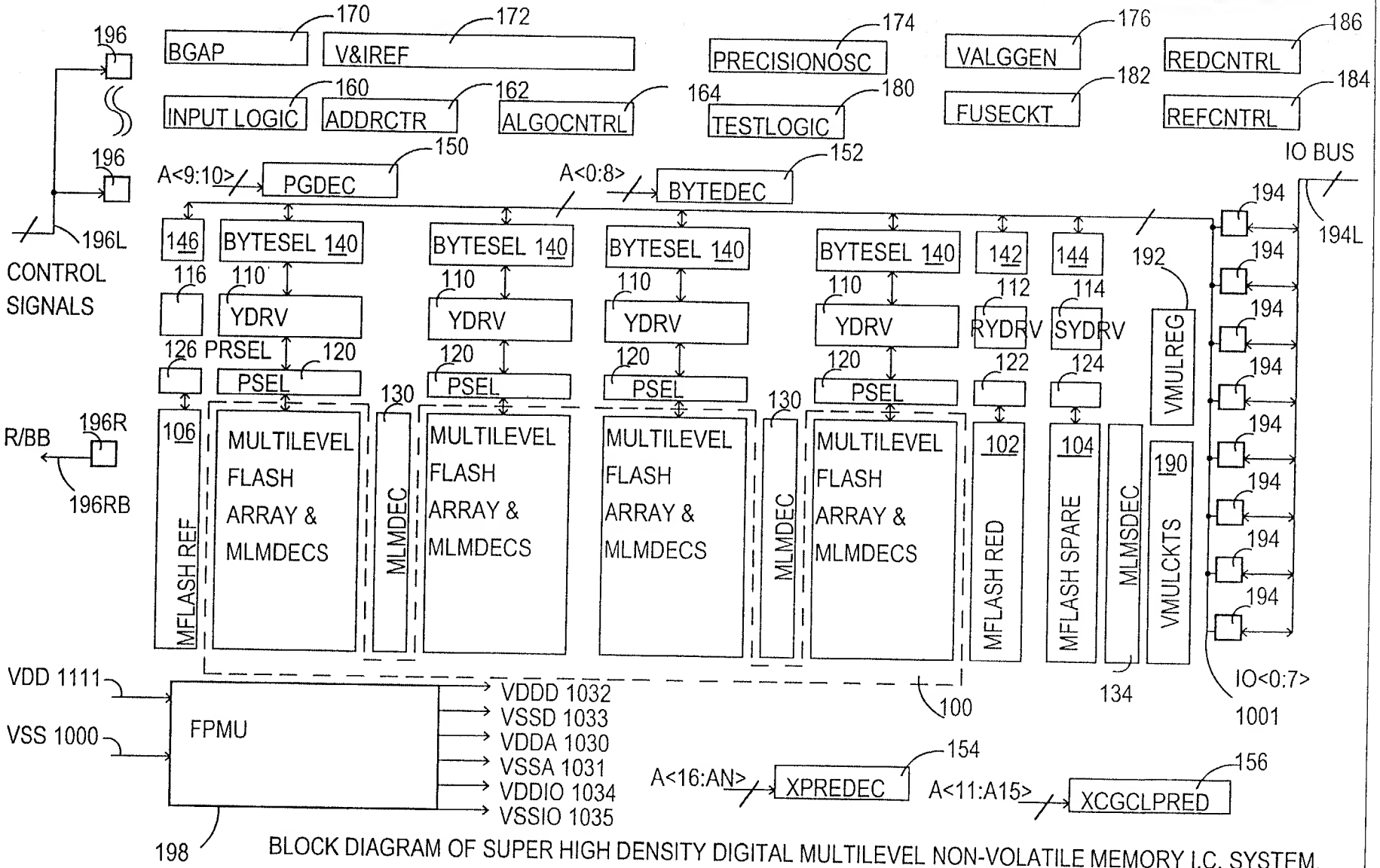
BLOCK DIAGRAM OF AN ELECTRONIC CAMERA SYSTEM

FIGURE 1D



BLOCK DIAGRAM OF AN ELECTRONIC AUDIO SYSTEM

FIGURE 1E



BLOCK DIAGRAM OF SUPER HIGH DENSITY DIGITAL MULTILEVEL NON-VOLATILE MEMORY I.C. SYSTEM.

FIGURE 2A

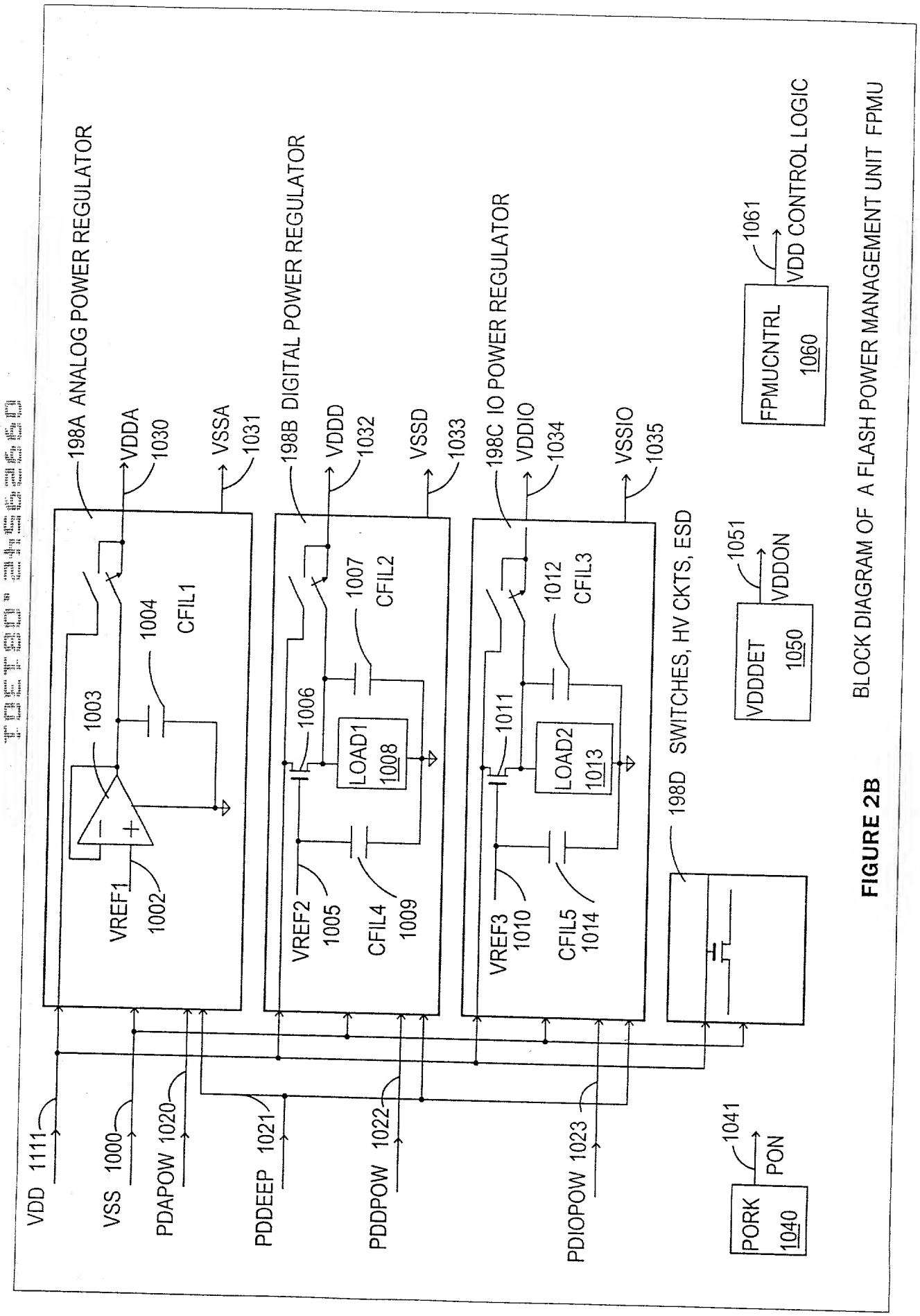
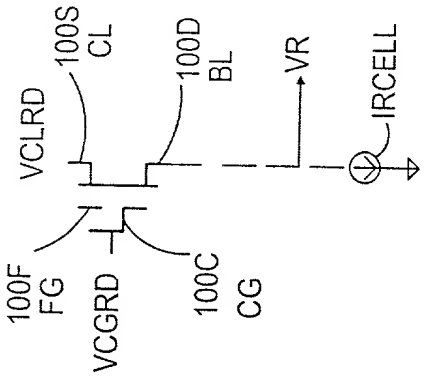
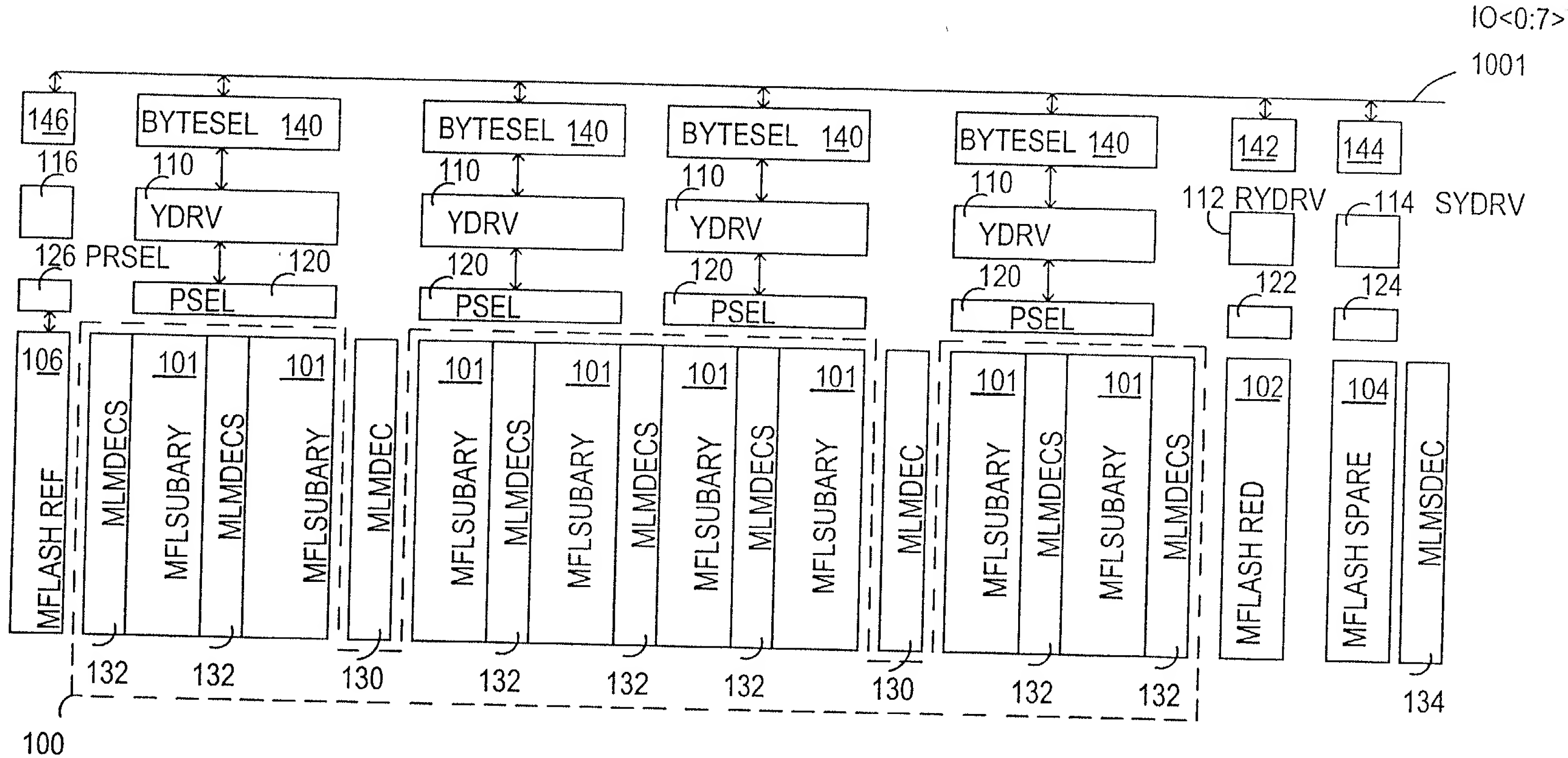


FIGURE 2B BLOCK DIAGRAM OF A FLASH POWER MANAGEMENT UNIT FPMU



VOLTAGE MODE SENSING

FIGURE 2C



BLOCK DIAGRAM OF SUPER HIGH DENSITY DIGITAL MULTILEVEL NON-VOLATILE MEMORY ARRAY ARCHITECTURE

FIGURE 3A

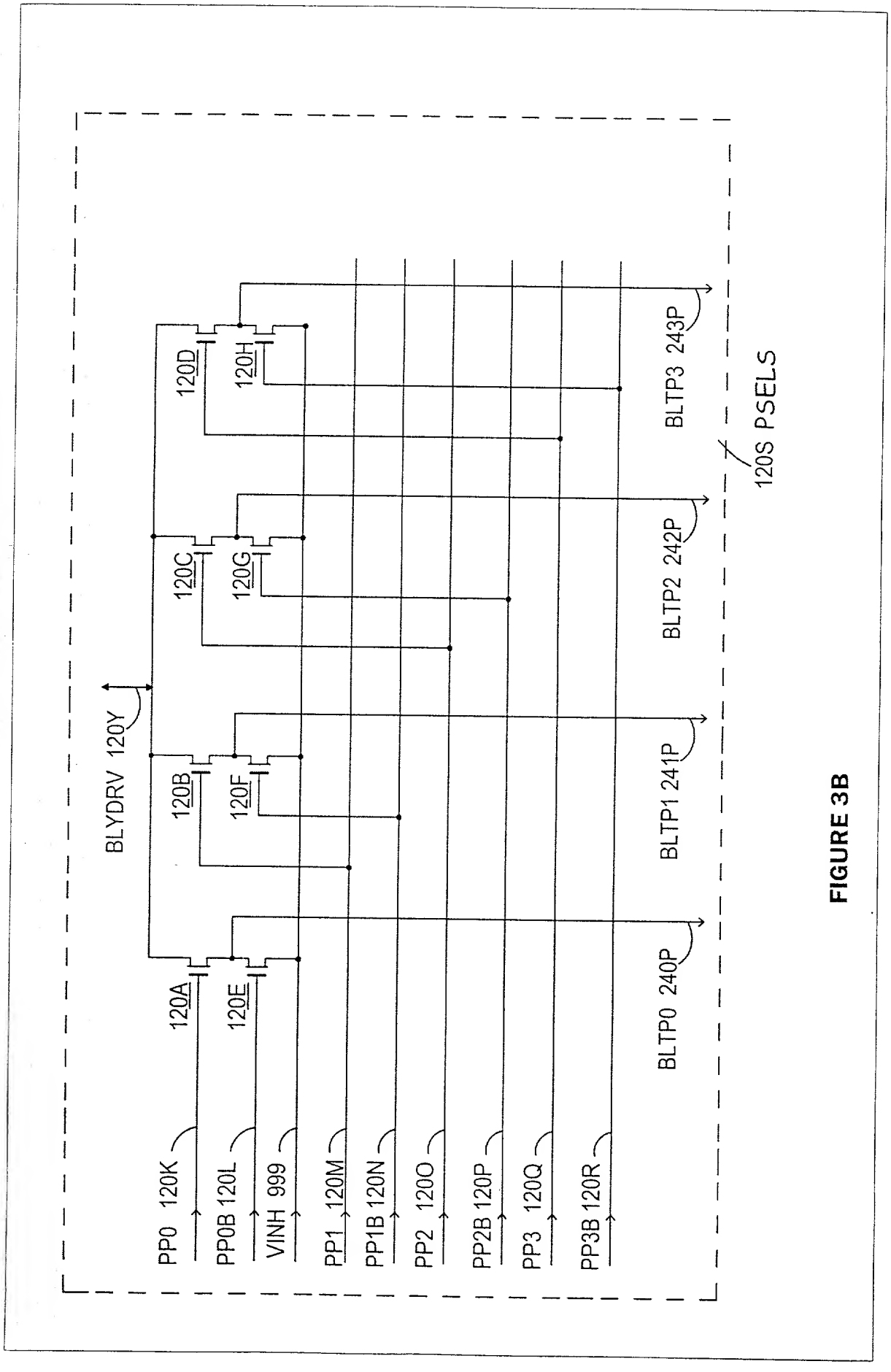

PP0 120K
PP0B 120L
VINH 999
PP1 120M
PP1B 120N
PP2 120O
PP2B 120P
PP3 120Q
PP3B 120R
BLYDRV 120Y
120A
120E
120B
120F
120C
120G
120D
120H
BLTP0 240P
BLTP1 241P
BLTP2 242P
BLTP3 243P
120S PSELS

FIGURE 3B

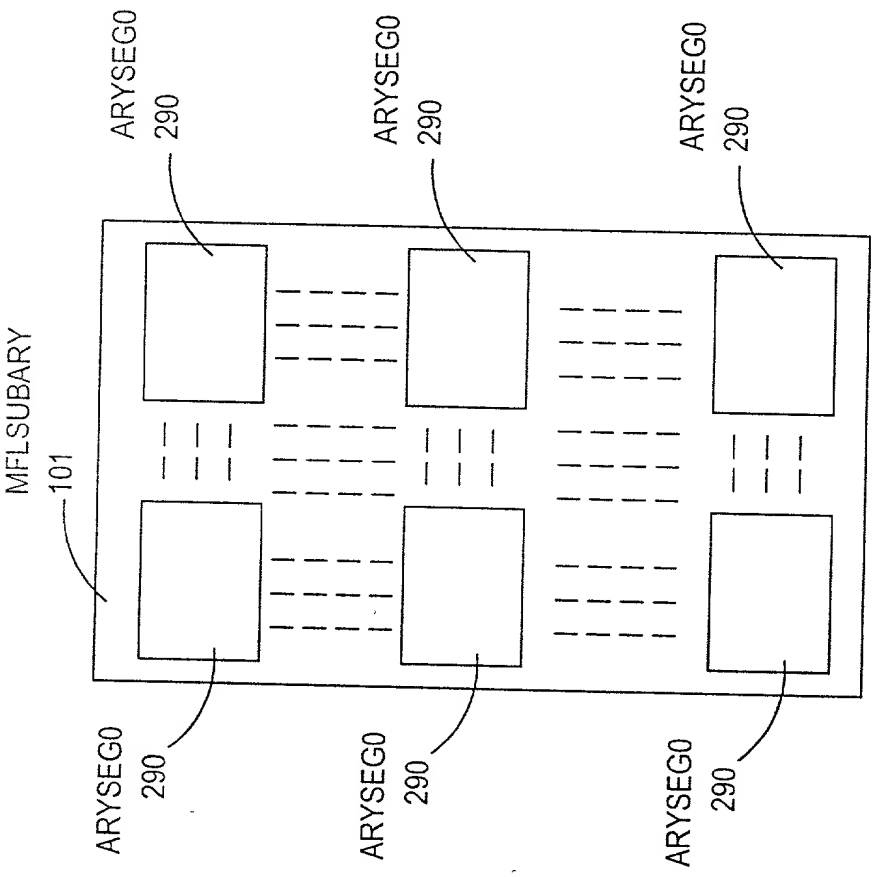

MFLSUBARY
101
ARYSEG0
290
ARYSEG0
290
ARYSEG0
290
ARYSEG0
290
ARYSEG0
290
ARYSEG0
290

FIGURE 3C

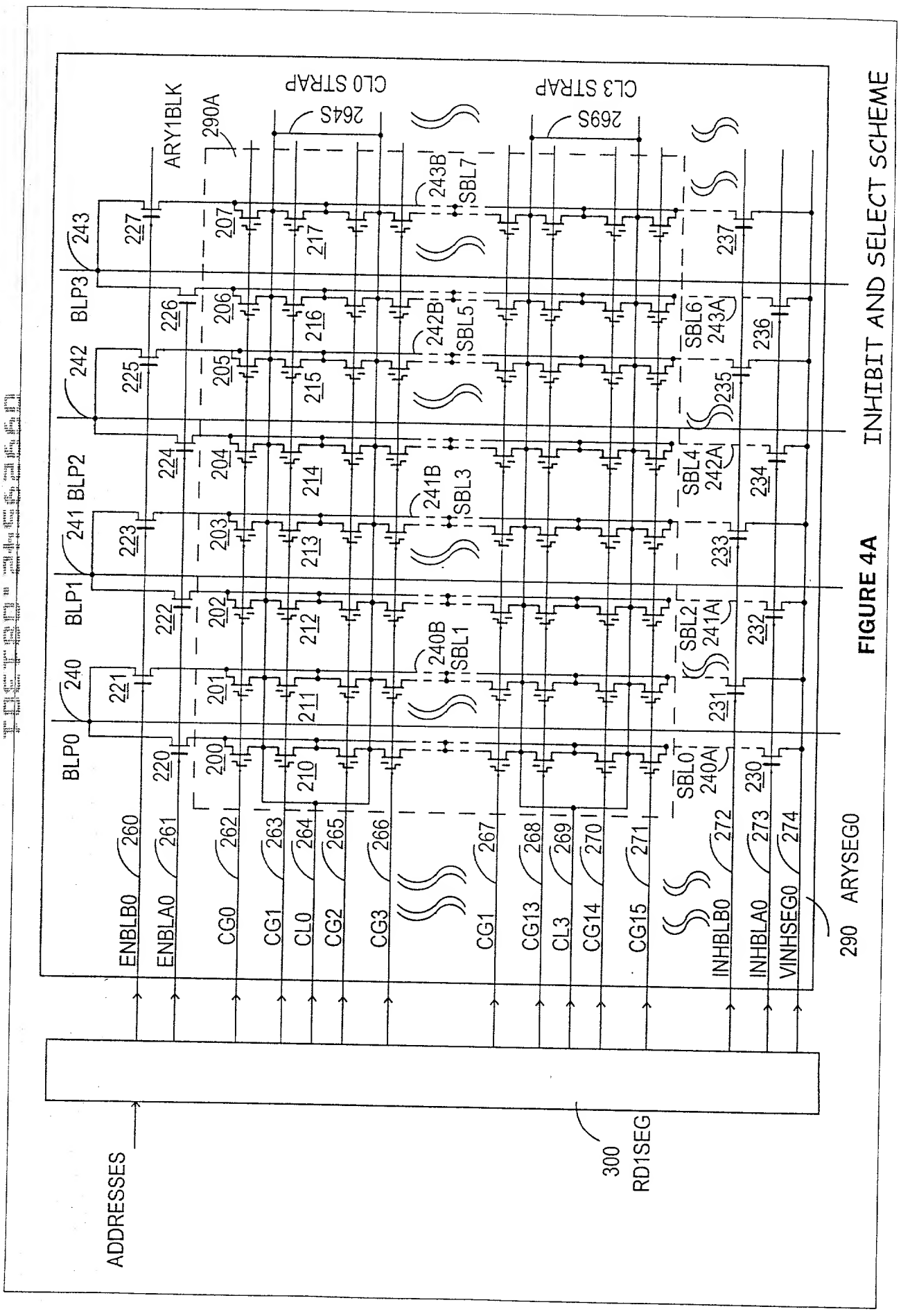


FIGURE 4A INHIBIT AND SELECT SCHEME

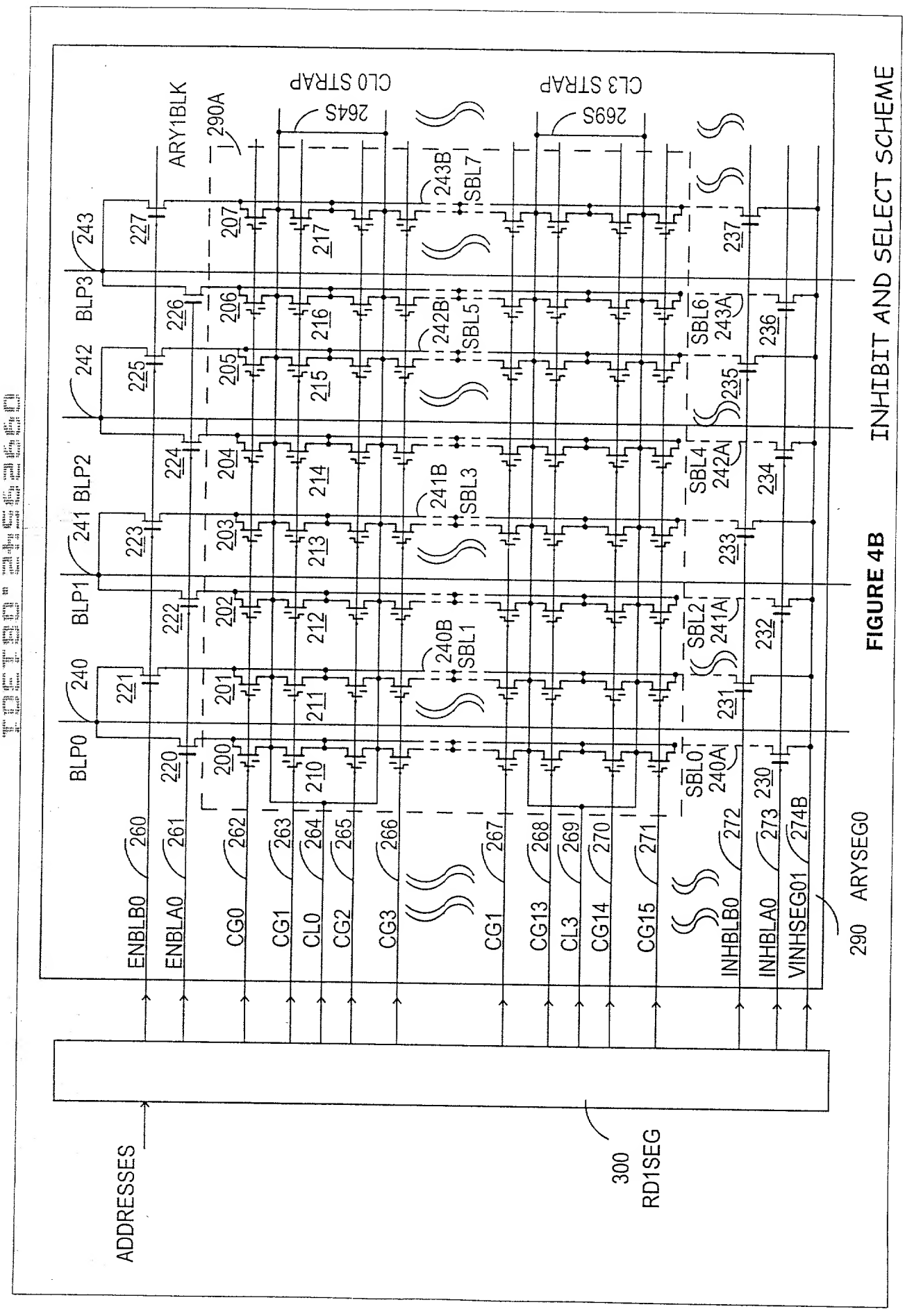


FIGURE 4B INHIBIT AND SELECT SCHEME

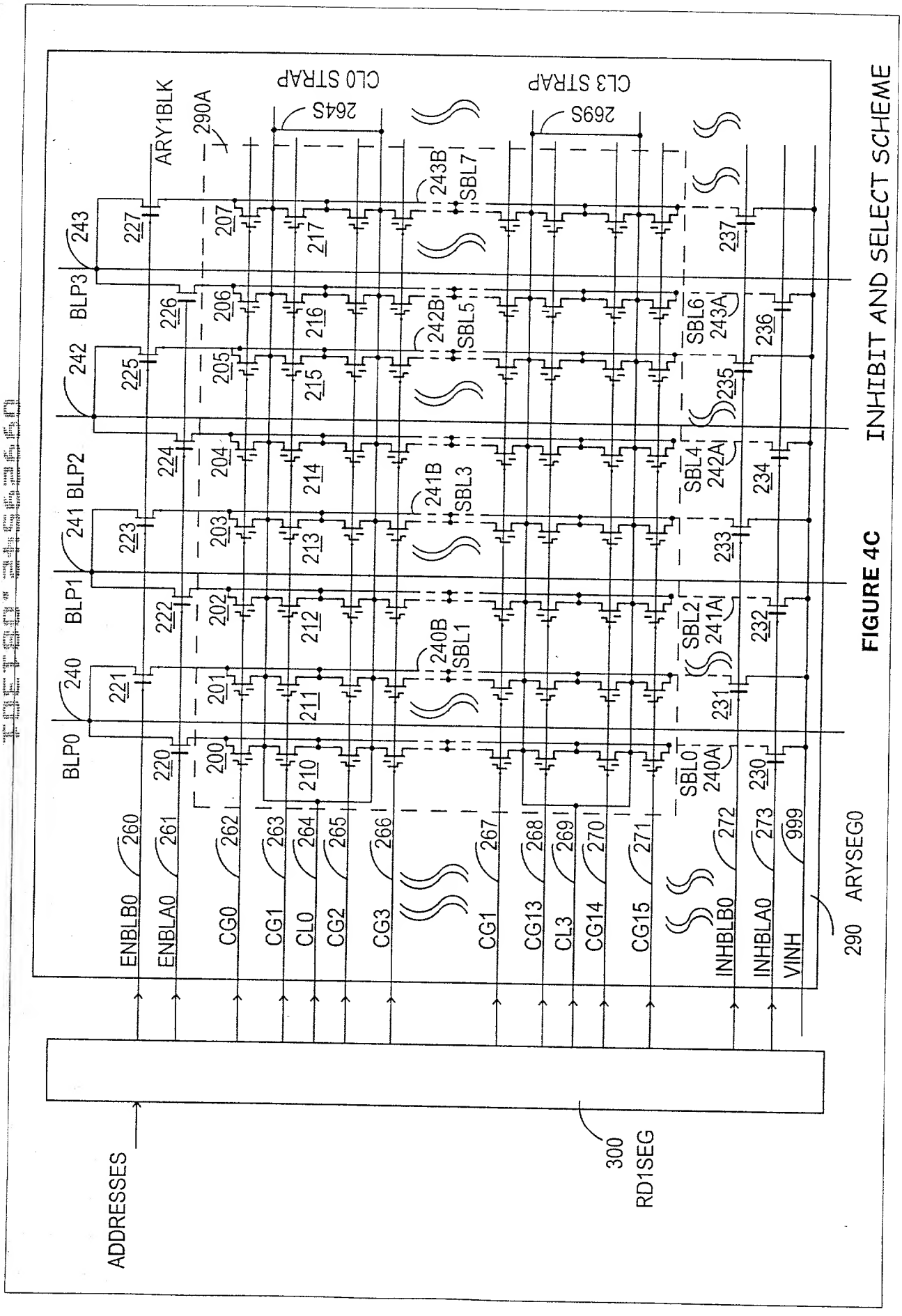


FIGURE 4C INHIBIT AND SELECT SCHEME

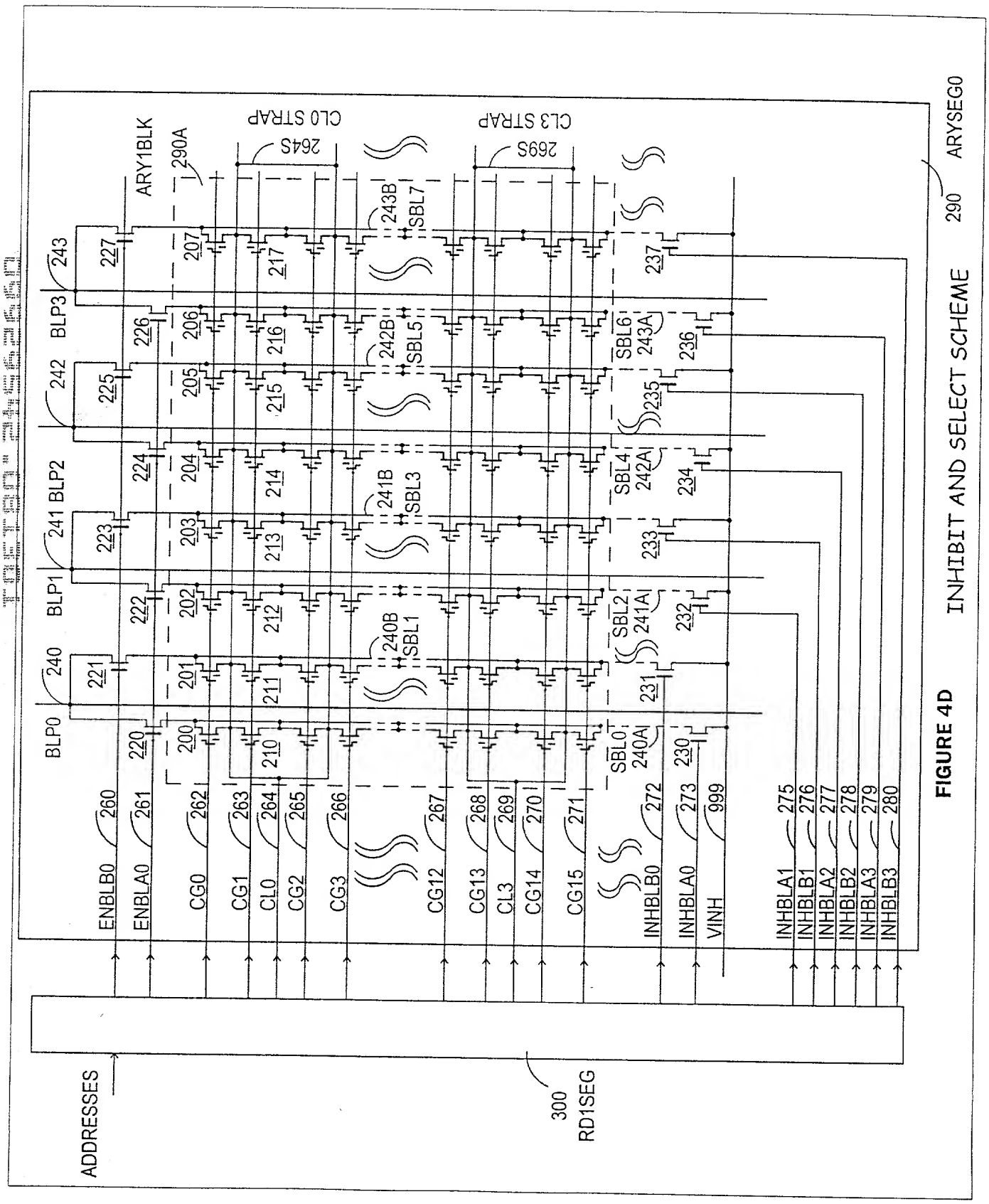


FIGURE 4D INHIBIT AND SELECT SCHEME

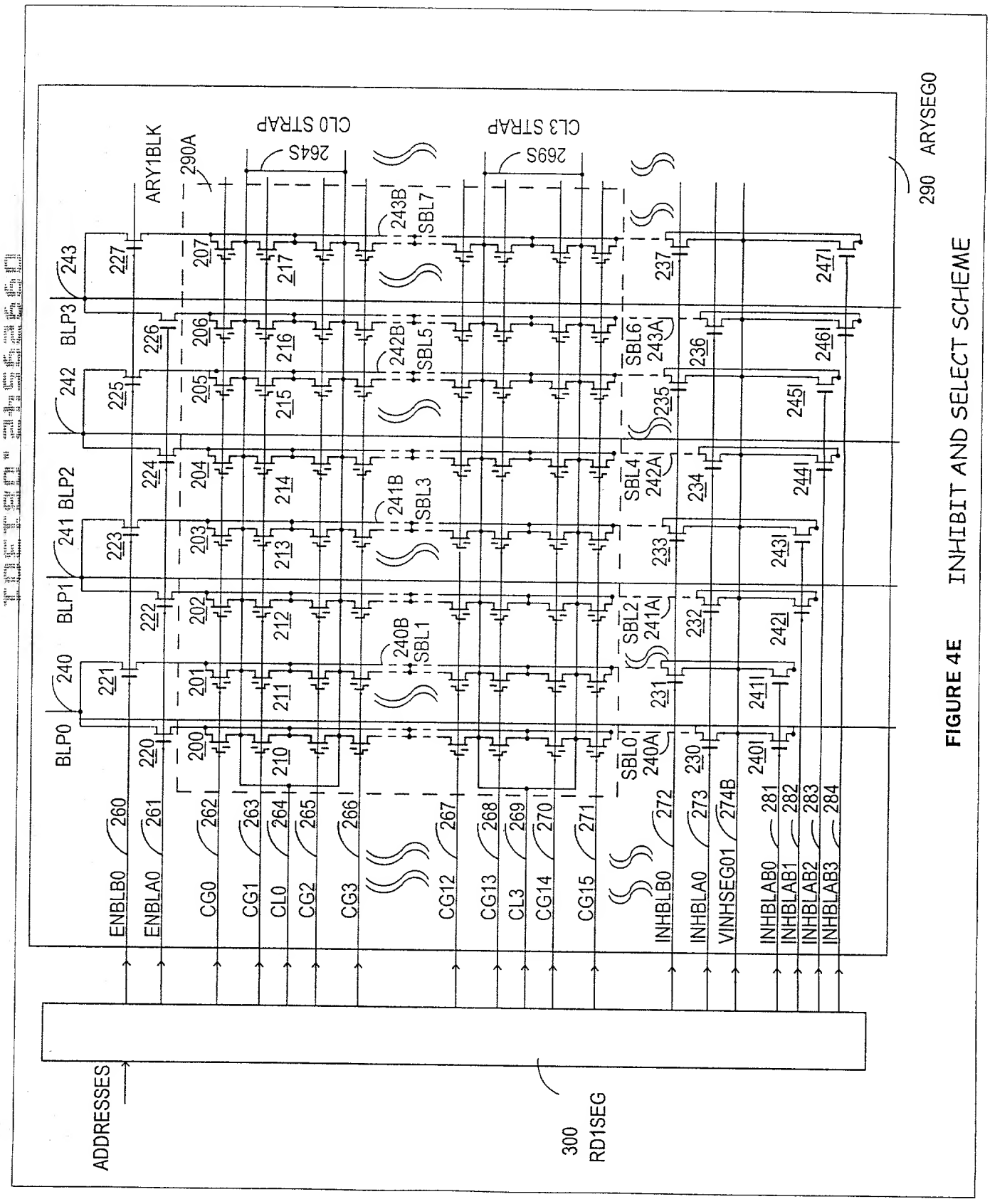


FIGURE 4E INHIBIT AND SELECT SCHEME

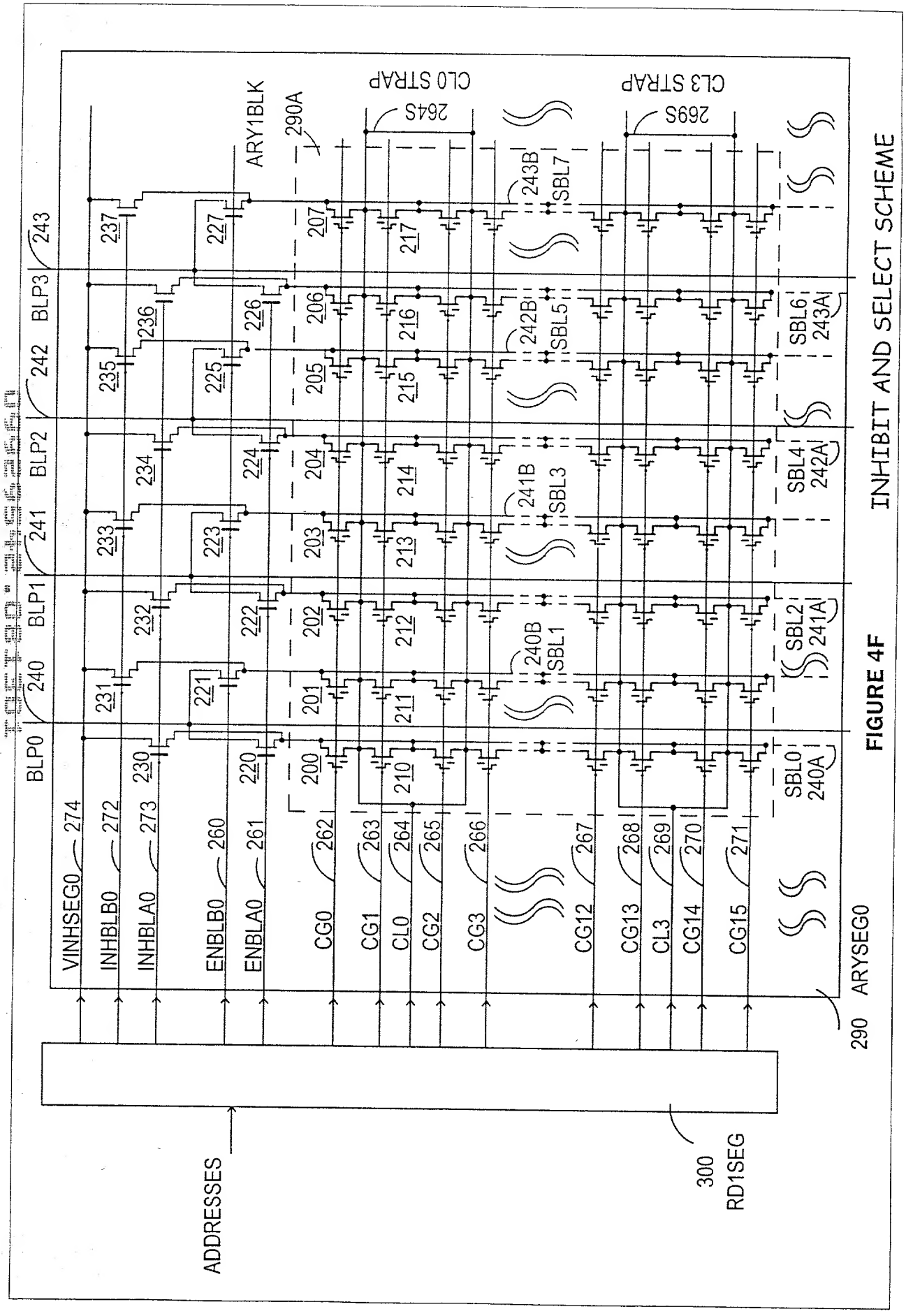
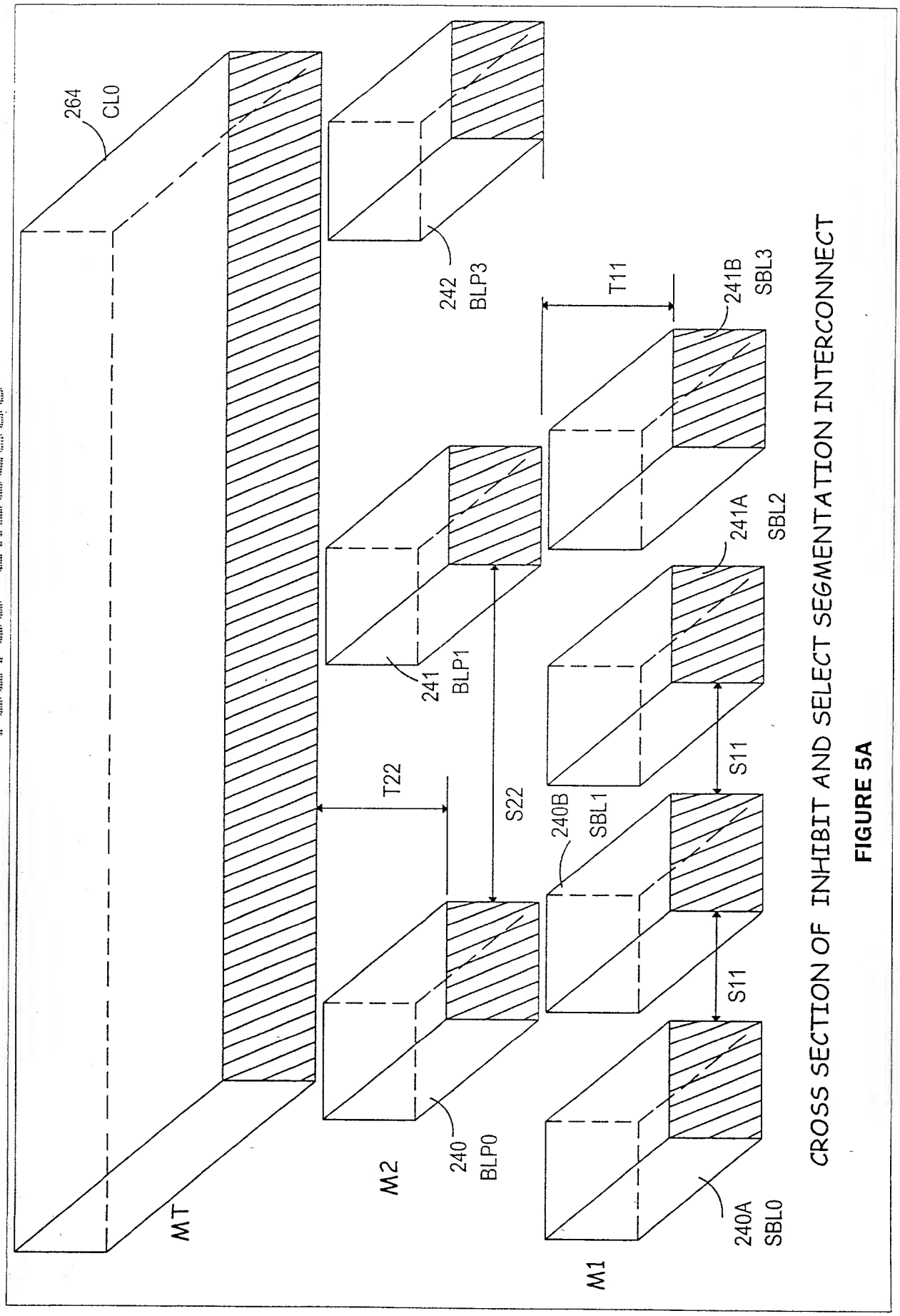
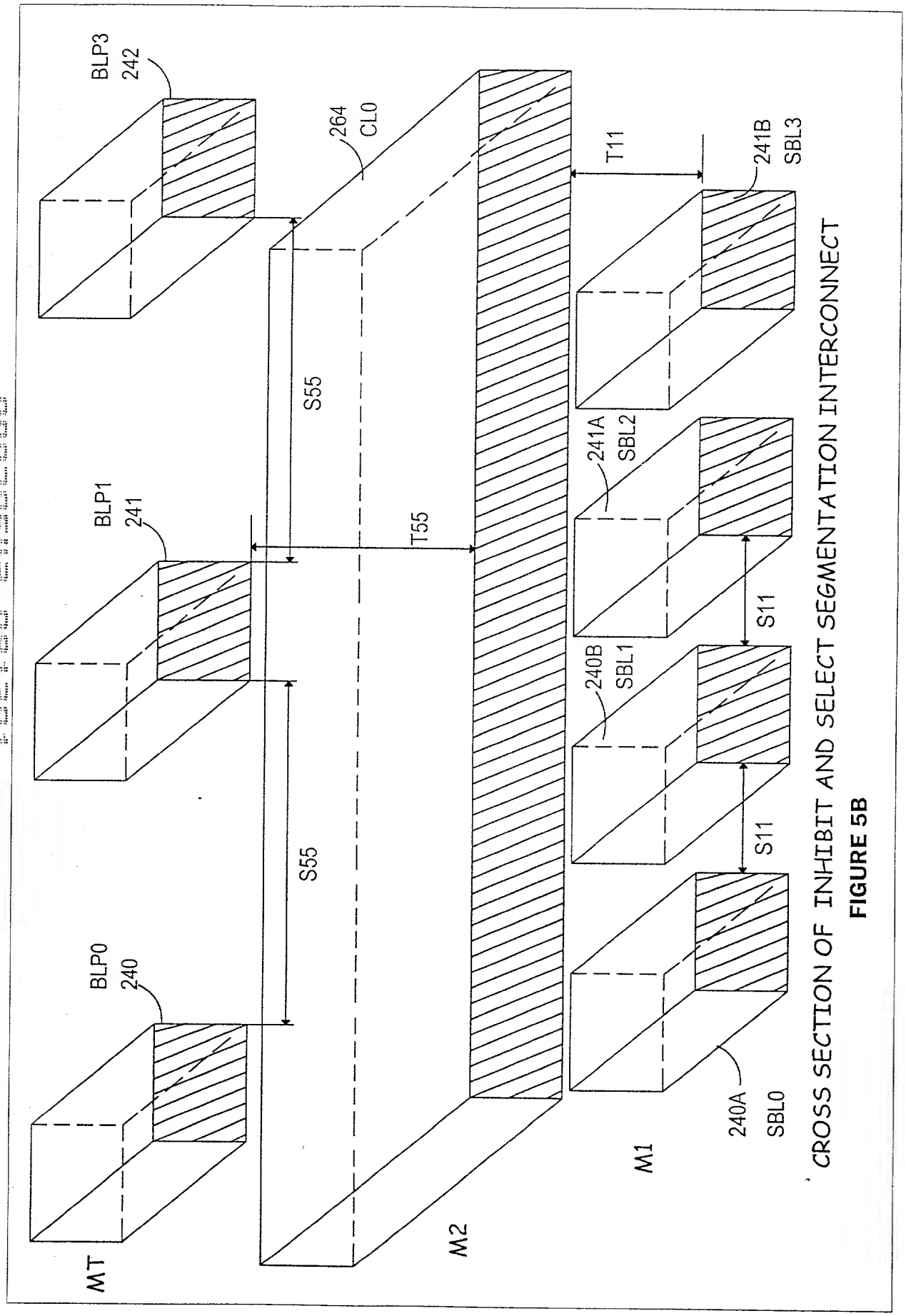


FIGURE 4F INHIBIT AND SELECT SCHEME



CROSS SECTION OF INHIBIT AND SELECT SEGMENTATION INTERCONNECT

FIGURE 5A



CROSS SECTION OF INHIBIT AND SELECT SEGMENTATION INTERCONNECT

FIGURE 5B

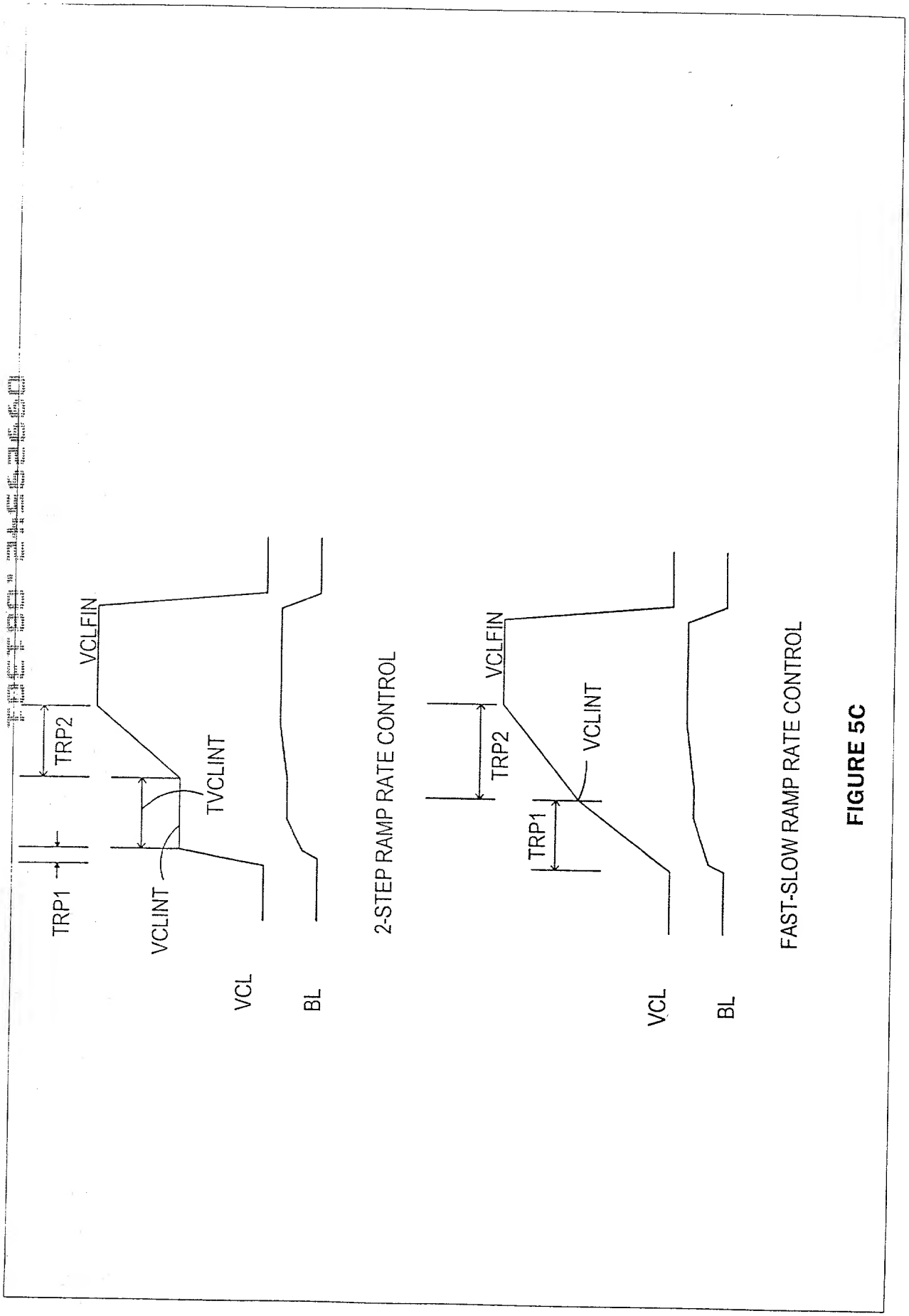
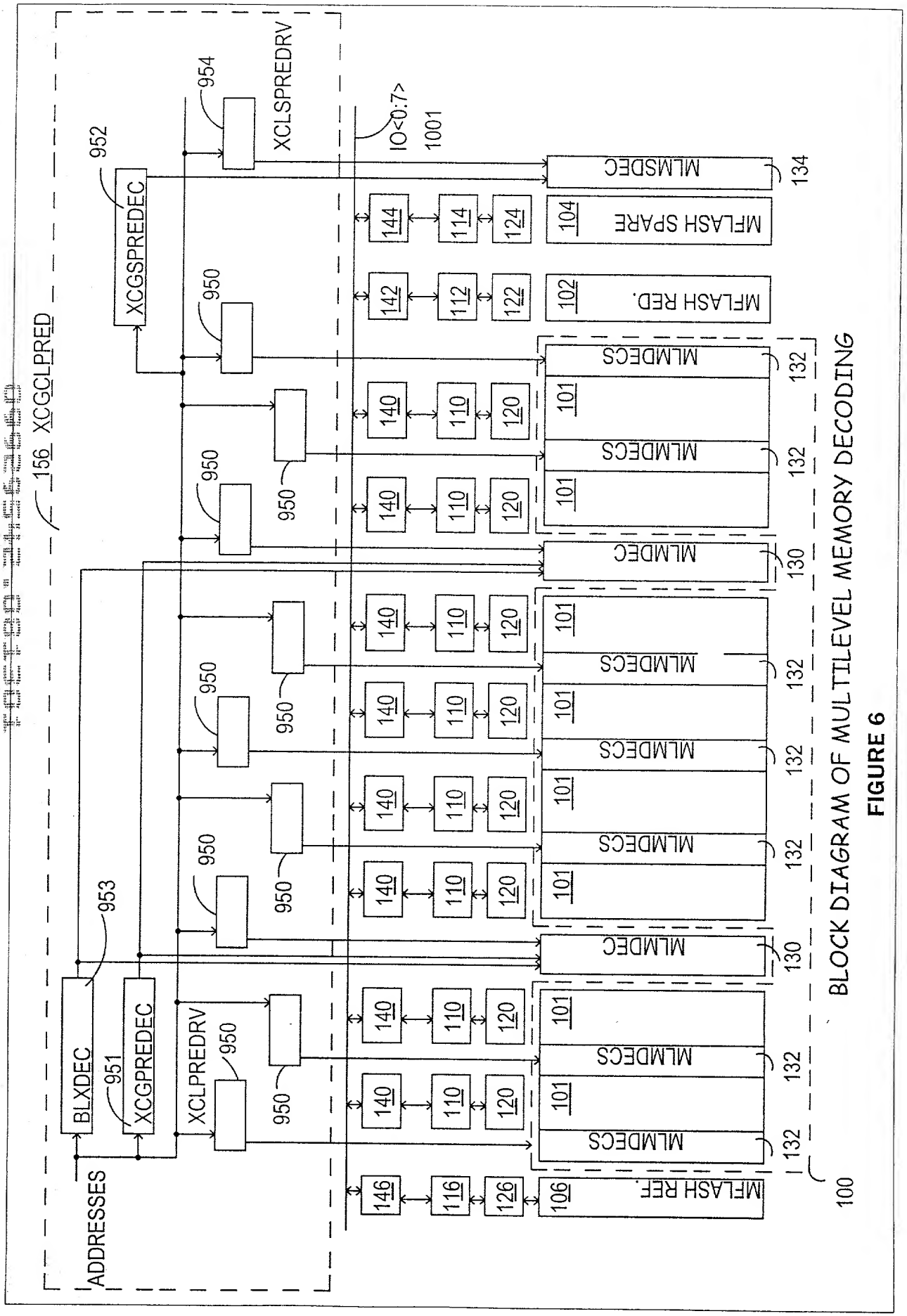
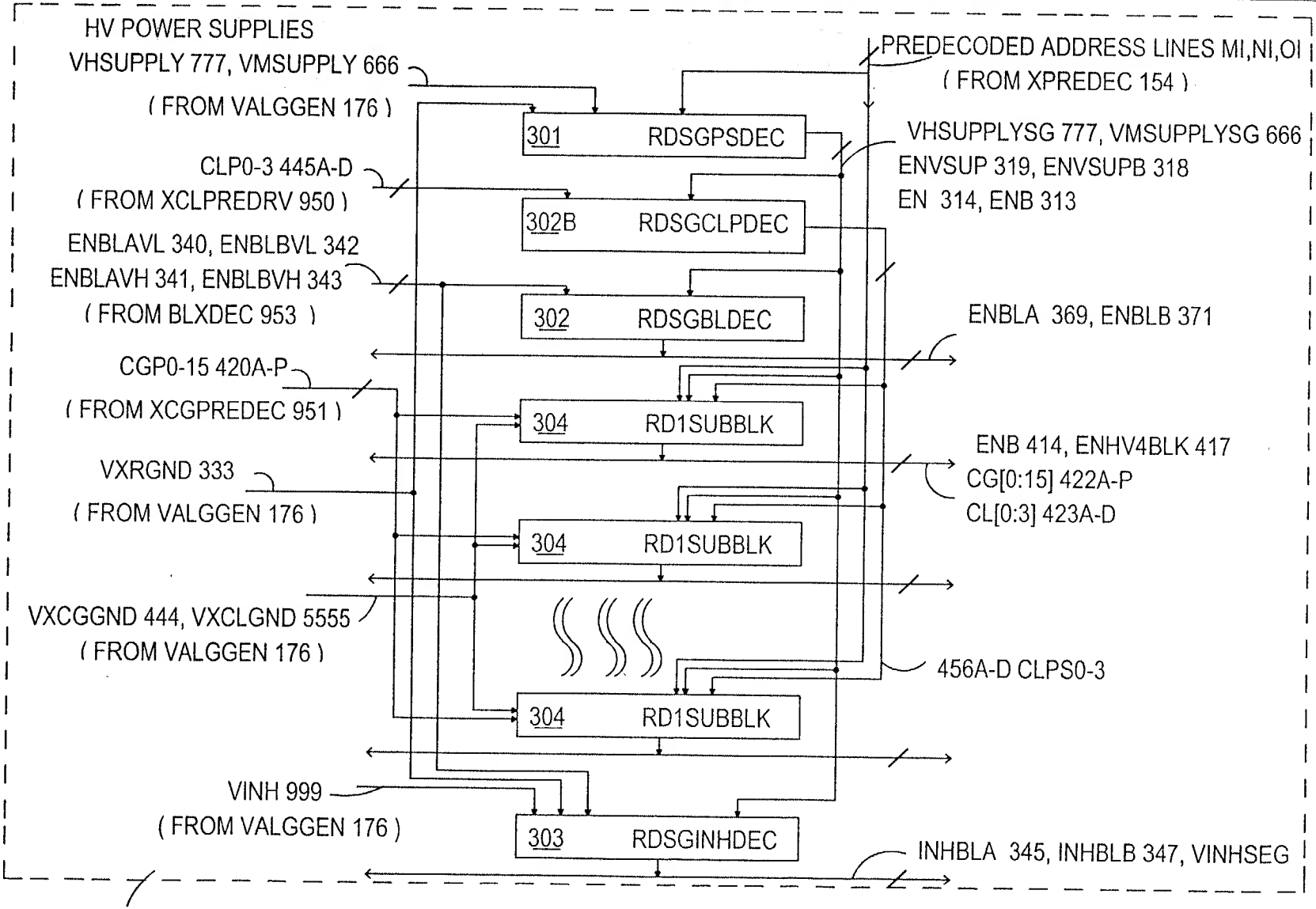

TRP1
TRP2
VCLFIN
TVCLINT
VCLINT
VCL
BL
2-STEP RAMP RATE CONTROL
TRP2
VCLFIN
VCLINT
TRP1
VCL
BL
FAST-SLOW RAMP RATE CONTROL

FIGURE 5C



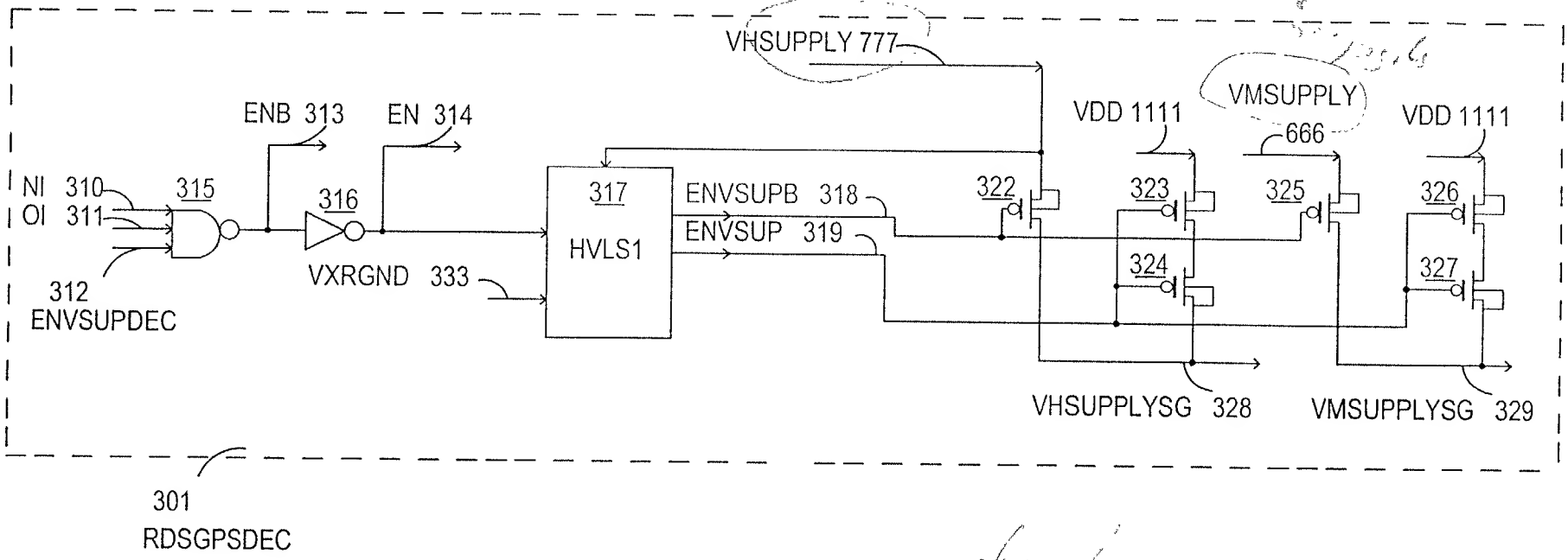
BLOCK DIAGRAM OF MULTILEVEL MEMORY DECODING

FIGURE 6



ONE SEGMENT DECODER

FIGURE 7



SEGMENTED POWER SUPPLY DECODER FOR MULTILEVEL MEMORY DECODING

FIGURE 8

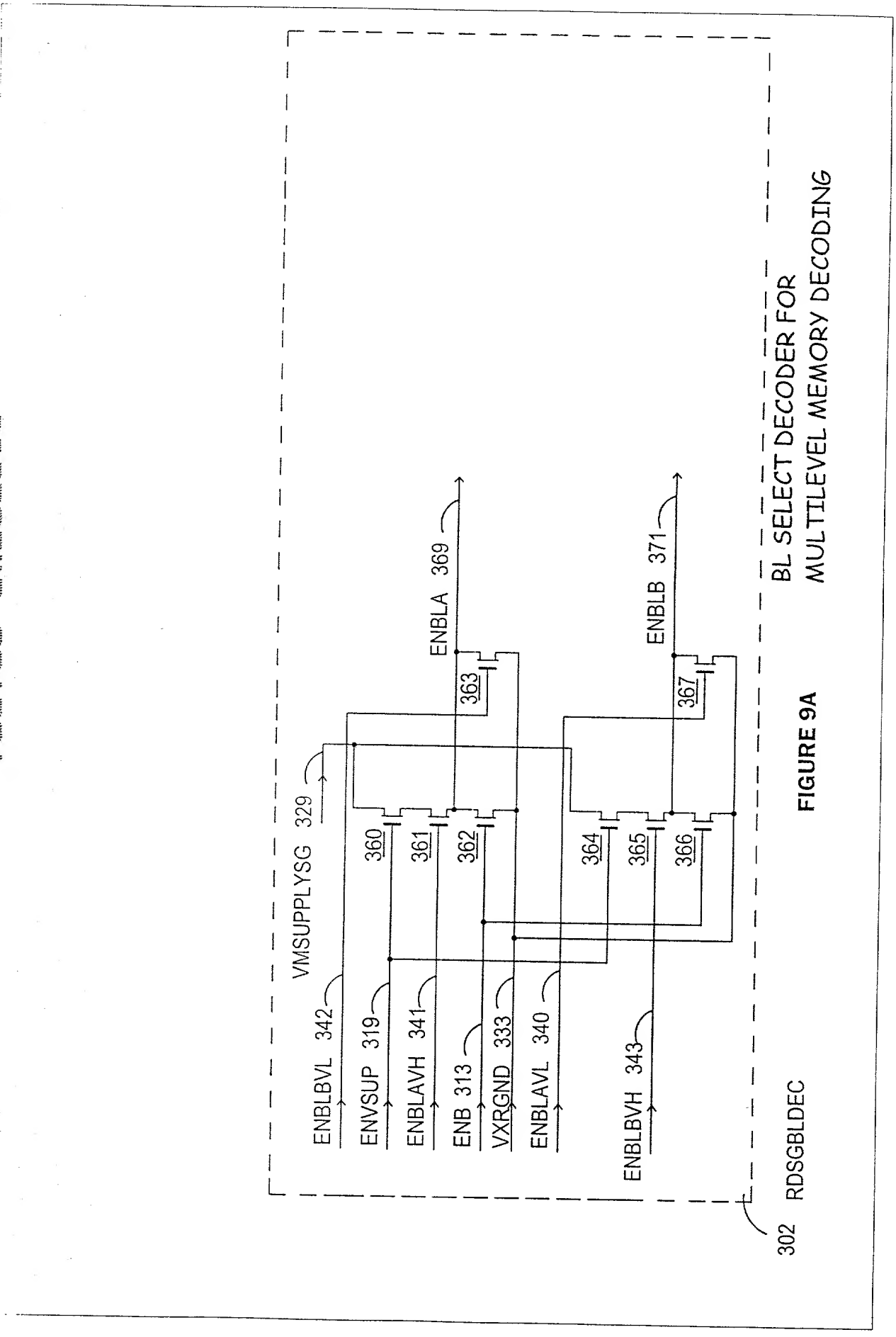

BL SELECT DECODER FOR
MULTILEVEL MEMORY DECODING
302 RDSGBLDEC
ENBLBVL 342
ENVSUP 319
ENBLAVH 341
ENB 313
VXRGND 333
ENBLAVL 340
ENBLBVH 343
VMSUPPLYSG 329
ENBLA 369
ENBLB 371
360
361
362
363
364
365
366
367

FIGURE 9A

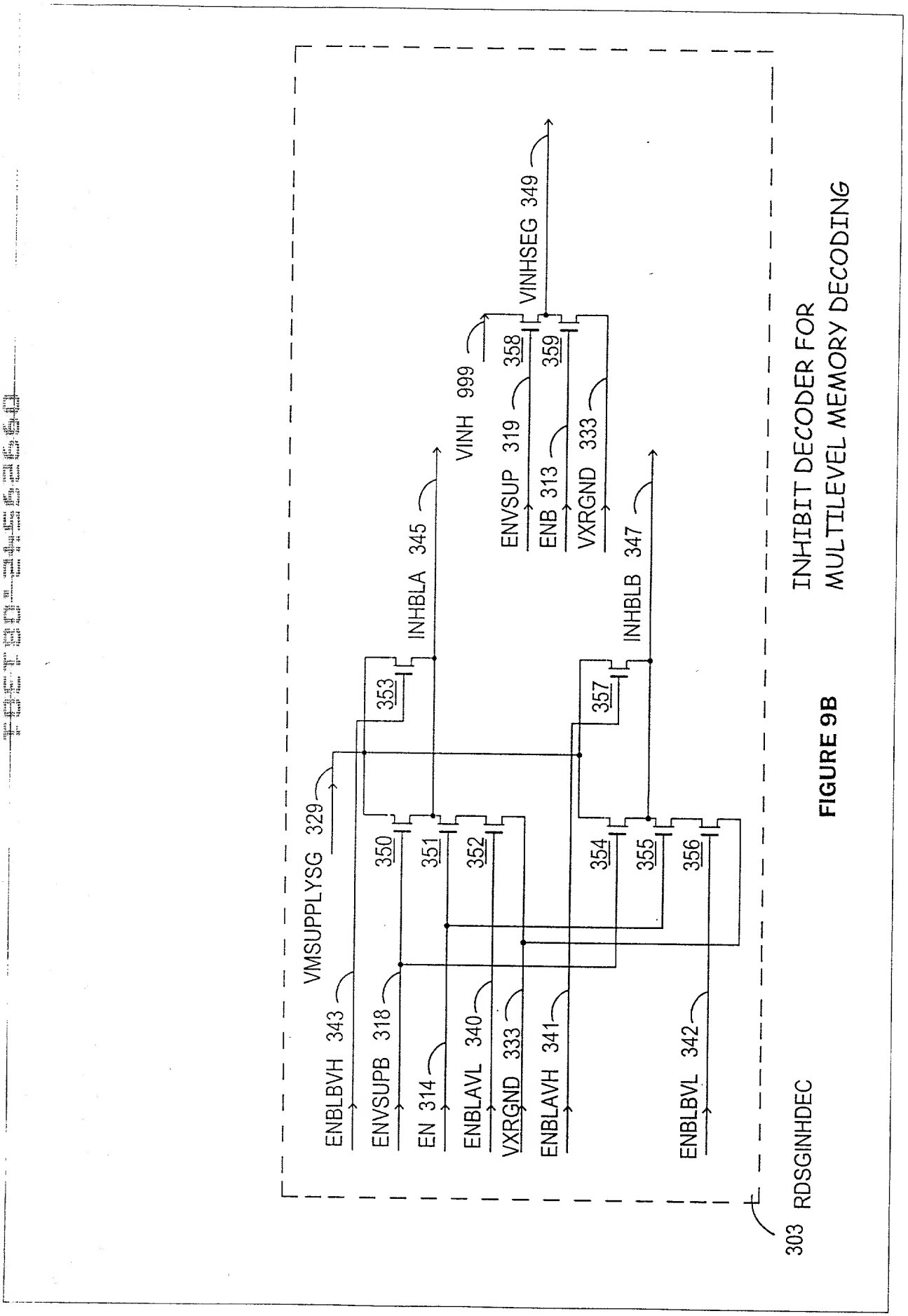


FIGURE 9B INHIBIT DECODER FOR MULTILEVEL MEMORY DECODING

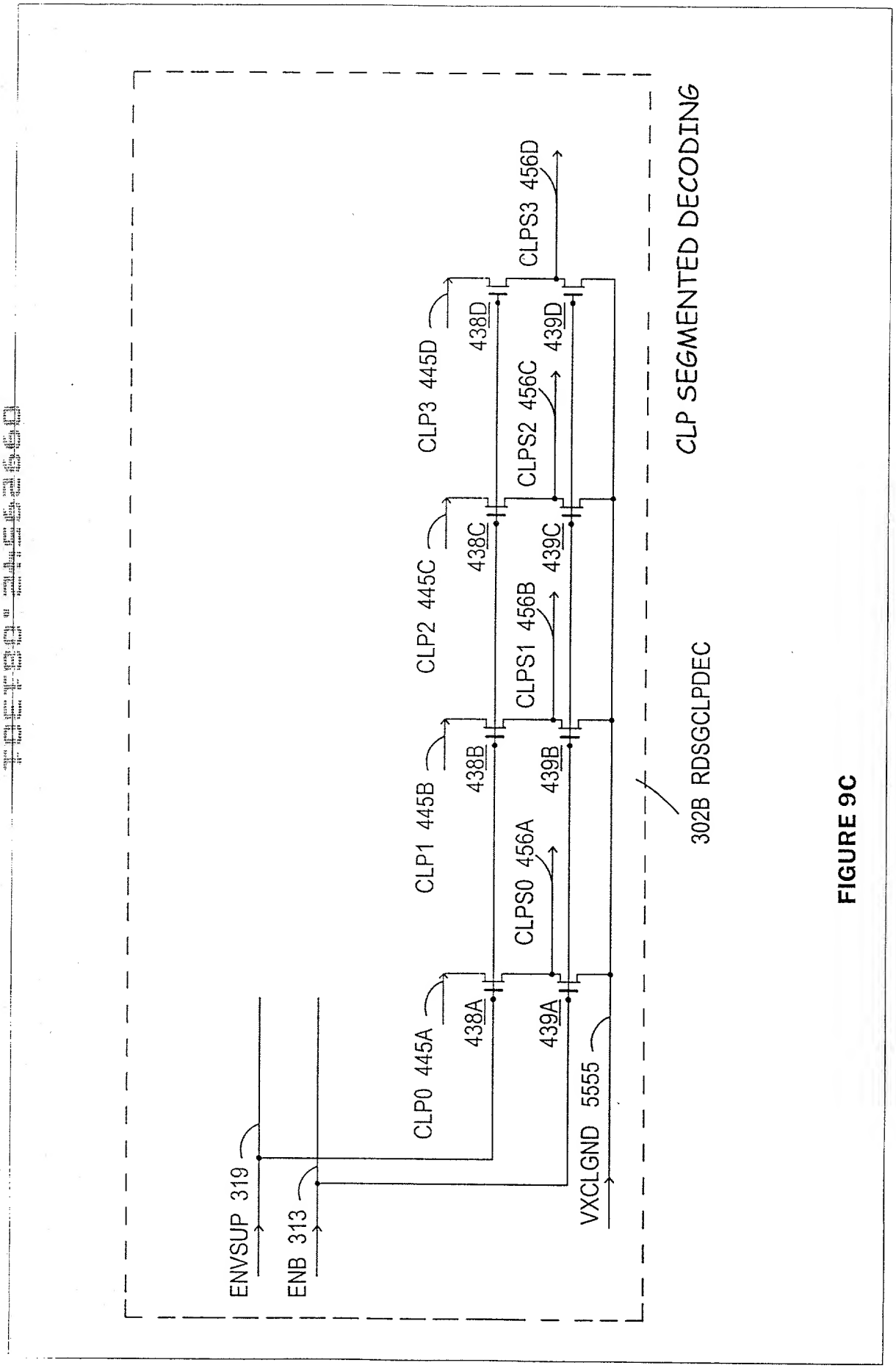

CLP SEGMENTED DECODING
302B RDSGCLPDEC
ENVSUP 319
ENB 313
VXCLGND 5555
CLP0 445A
CLP1 445B
CLP2 445C
CLP3 445D
438A
438B
438C
438D
439A
439B
439C
439D
CLPS0 456A
CLPS1 456B
CLPS2 456C
CLPS3 456D

FIGURE 9C

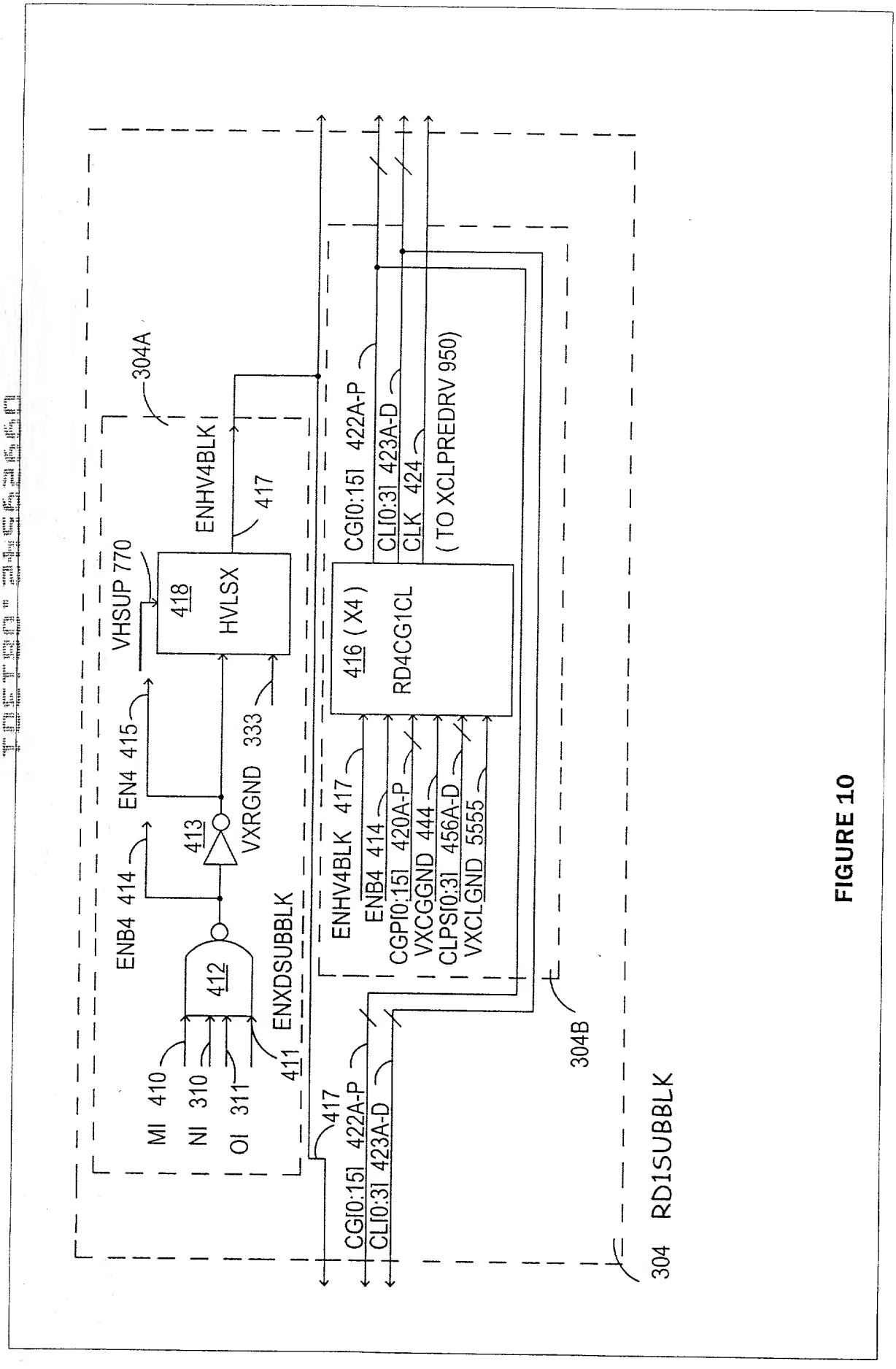

304 RD1SUBBLK
MI 410
NI 310
OI 311
411 ENXDSUBBLK
412
413
ENB4 414
EN4 415
VXRGND 333
VHSUP 770
418
HVLSX
ENHV4BLK
417
304A
304B
416 (X4)
RD4CG1CL
CG[0:15] 422A-P
CL[0:31] 423A-D
CLK 424
(TO XCLPREDRV 950)
ENHV4BLK 417
ENB4 414
CGP[0:15] 420A-P
VXCGGND 444
CLPS[0:31] 456A-D
VXCLGND 5555
417
CG[0:15] 422A-P
CL[0:31] 423A-D

FIGURE 10

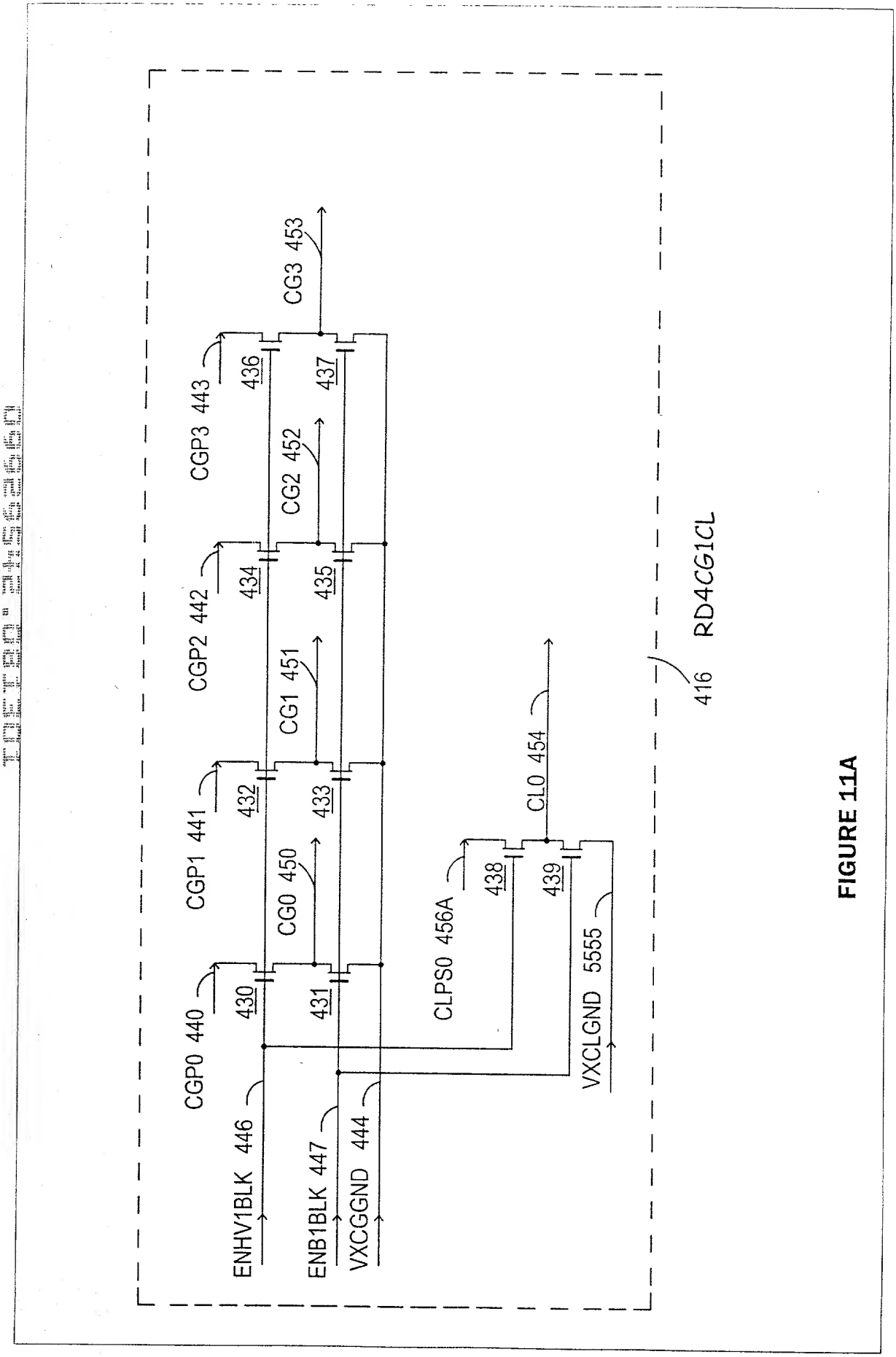

RD4CG1CL
416
CGP0 440
CGP1 441
CGP2 442
CGP3 443
CG0 450
CG1 451
CG2 452
CG3 453
CL0 454
CLPS0 456A
VXCLGND 5555
ENHV1BLK 446
ENB1BLK 447
VXCGGND 444
430
431
432
433
434
435
436
437
438
439

FIGURE 11A

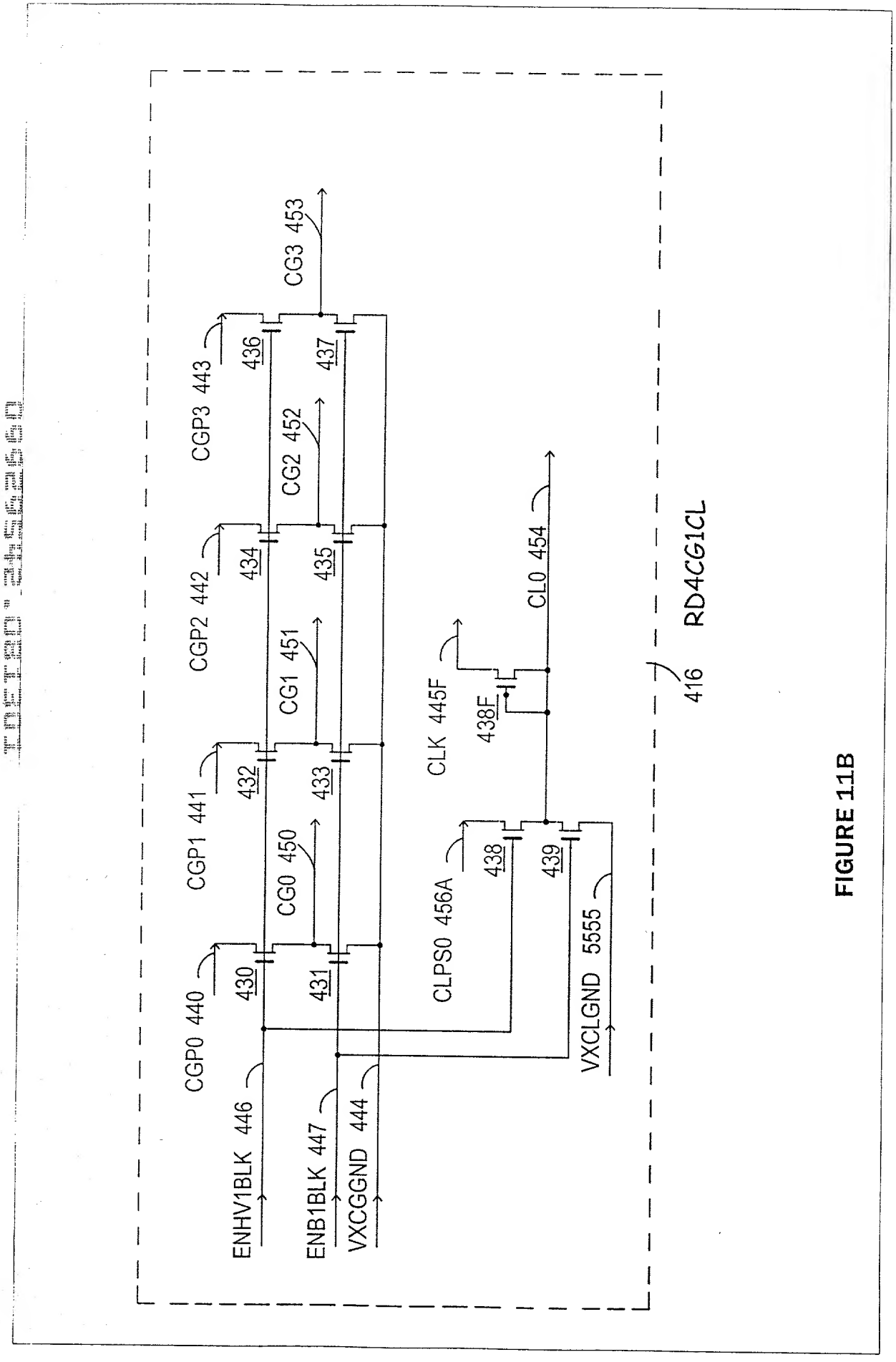

CGP0 440
CGP1 441
CGP2 442
CGP3 443
CG0 450
CG1 451
CG2 452
CG3 453
CLK 445F
CL0 454
CLPS0 456A
VXCLGND 5555
ENHV1BLK 446
ENB1BLK 447
VXCGGND 444
430
431
432
433
434
435
436
437
438
438F
439
416
RD4CG1CL

FIGURE 11B

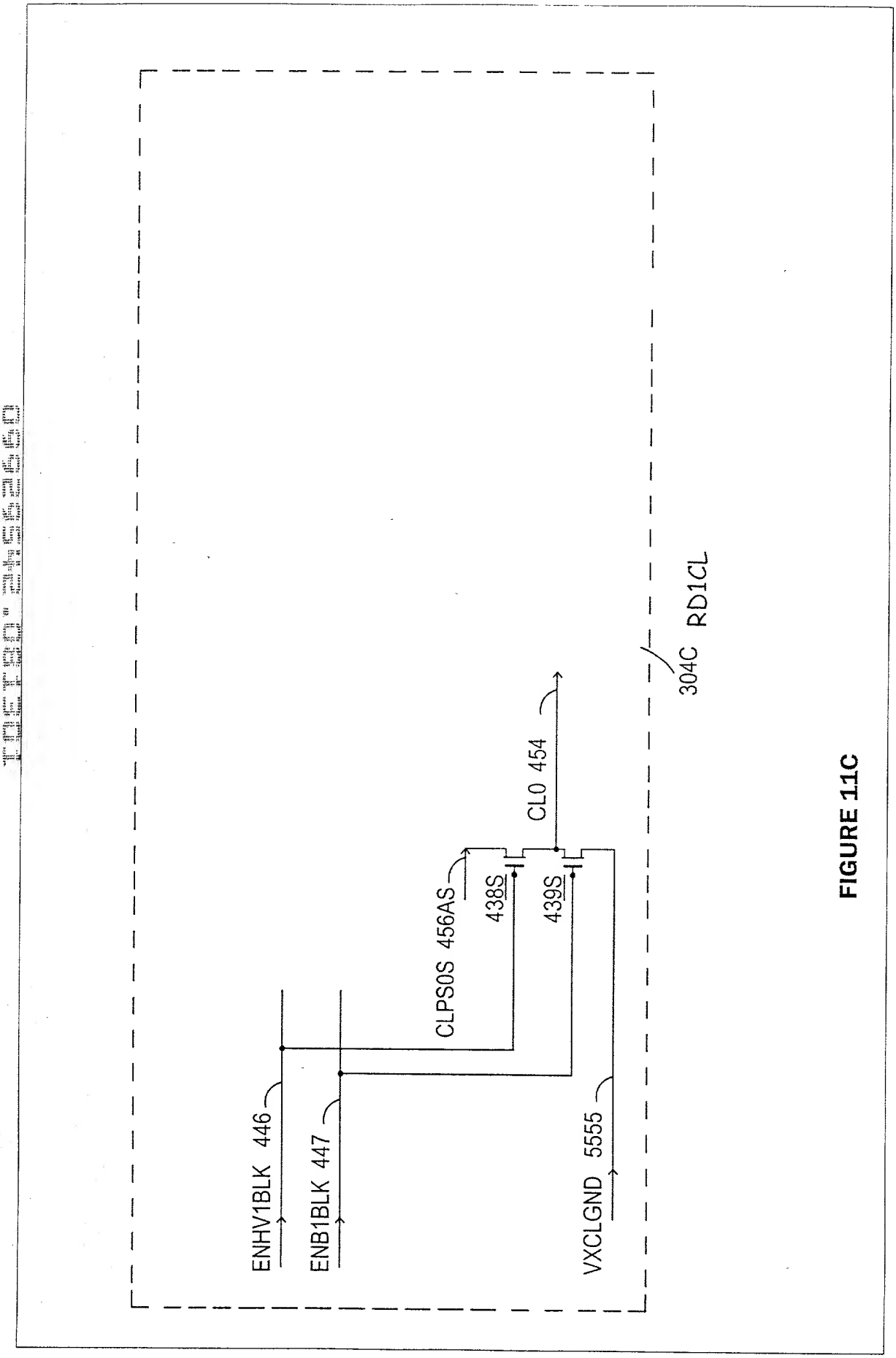

ENHV1BLK 446
ENB1BLK 447
CLPS0S 456AS
438S
439S
CL0 454
VXCLGND 5555
304C RD1CL

FIGURE 11C

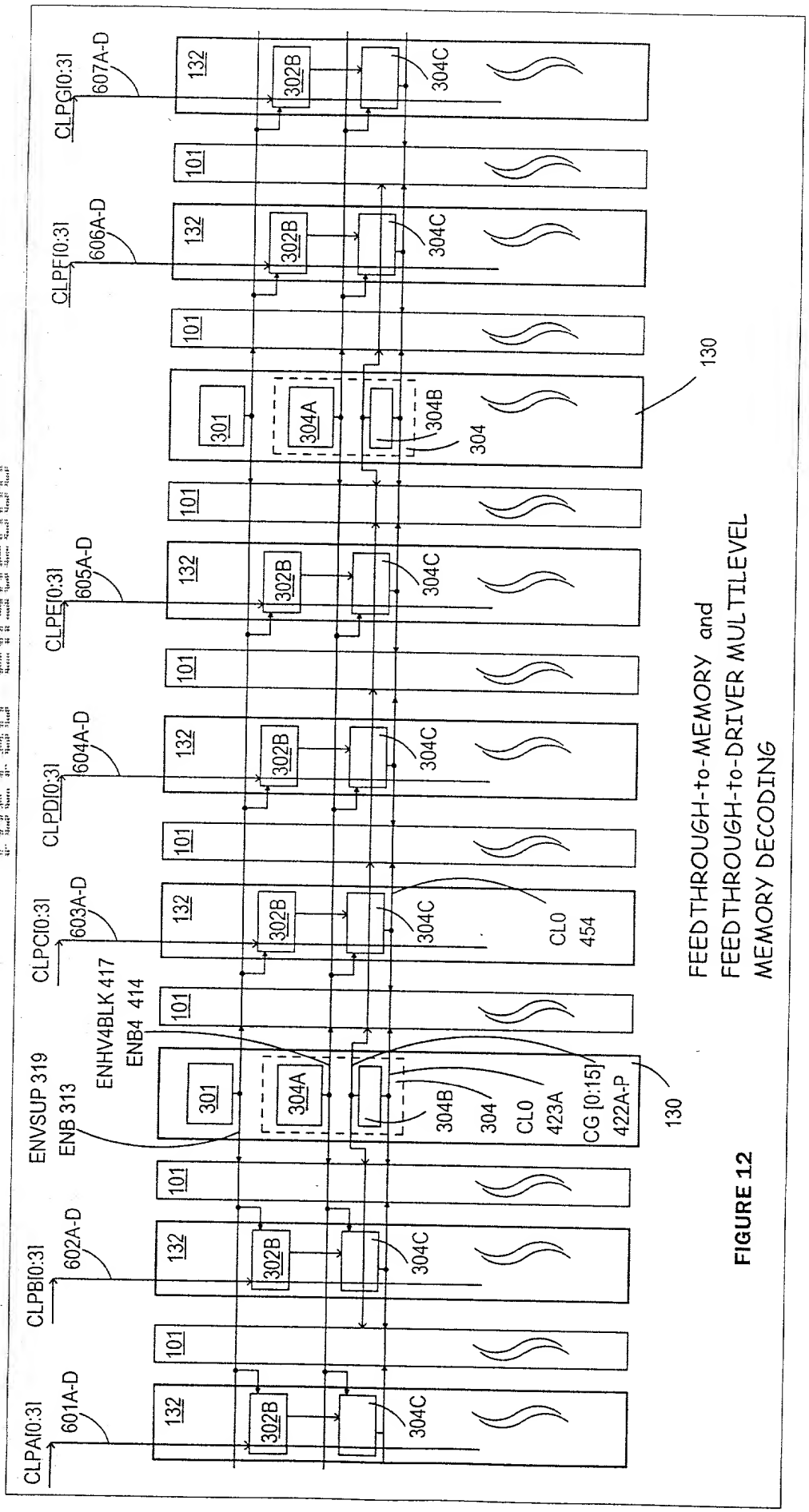
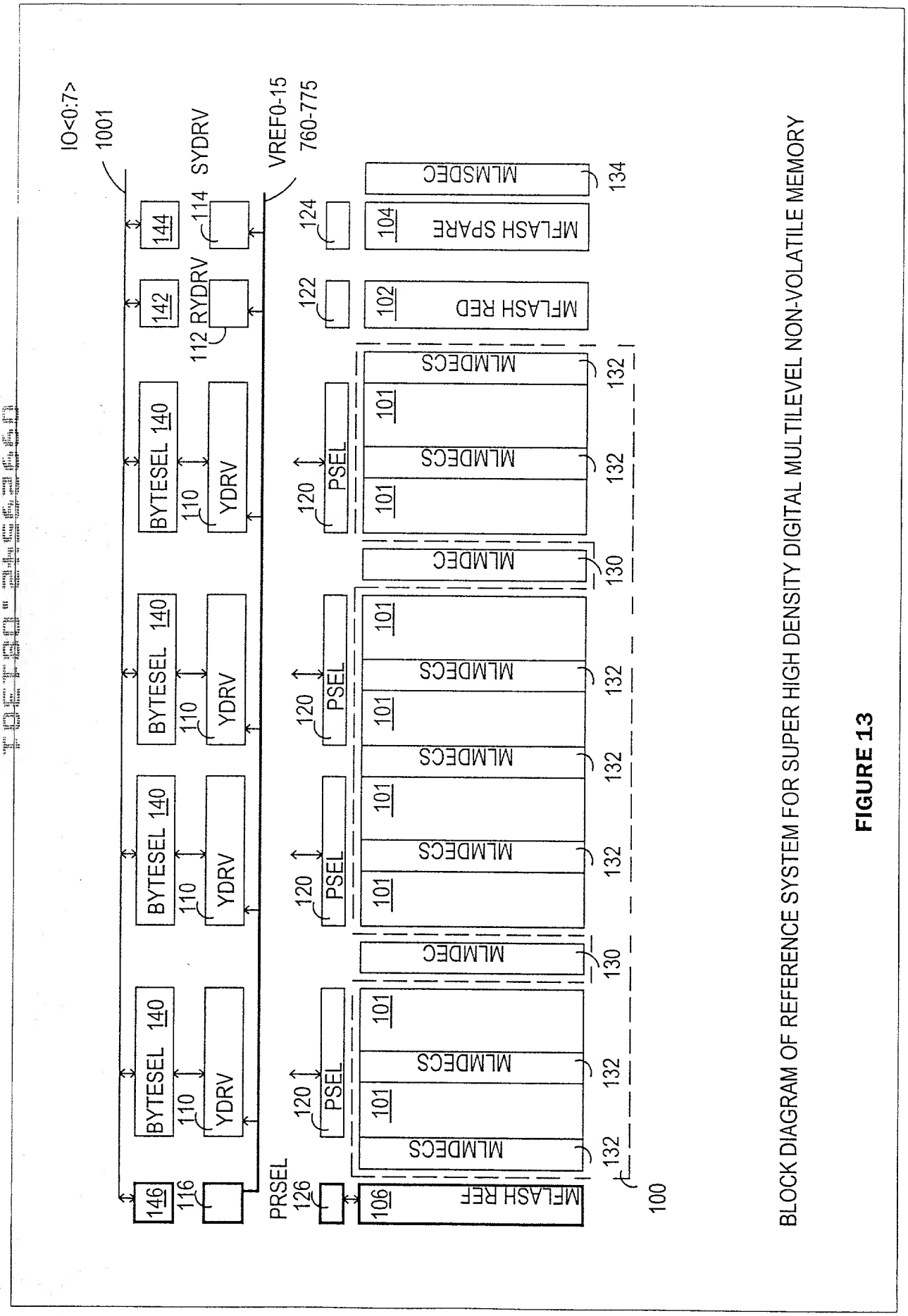


FIGURE 12

FEEDTHROUGH-to-MEMORY and
FEEDTHROUGH-to-DRIVER MULTILEVEL
MEMORY DECODING



BLOCK DIAGRAM OF REFERENCE SYSTEM FOR SUPER HIGH DENSITY DIGITAL MULTILEVEL NON-VOLATILE MEMORY

FIGURE 13

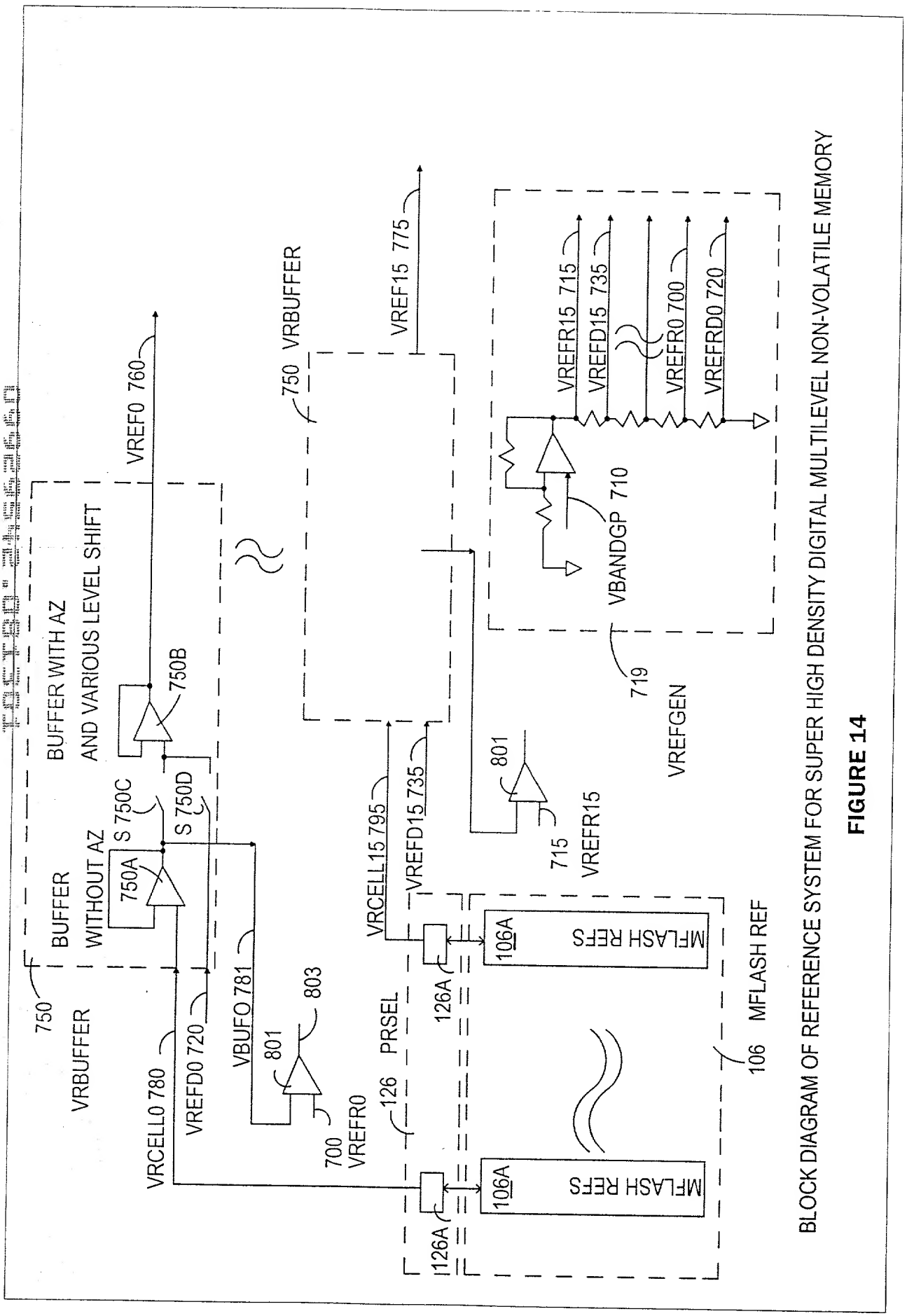
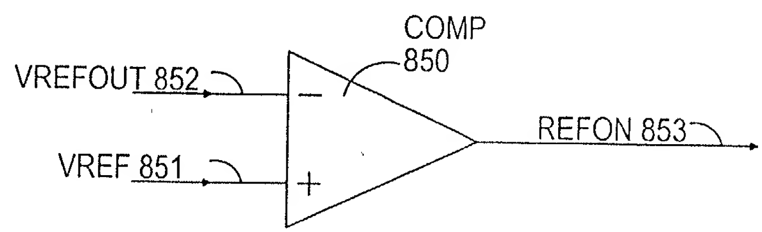


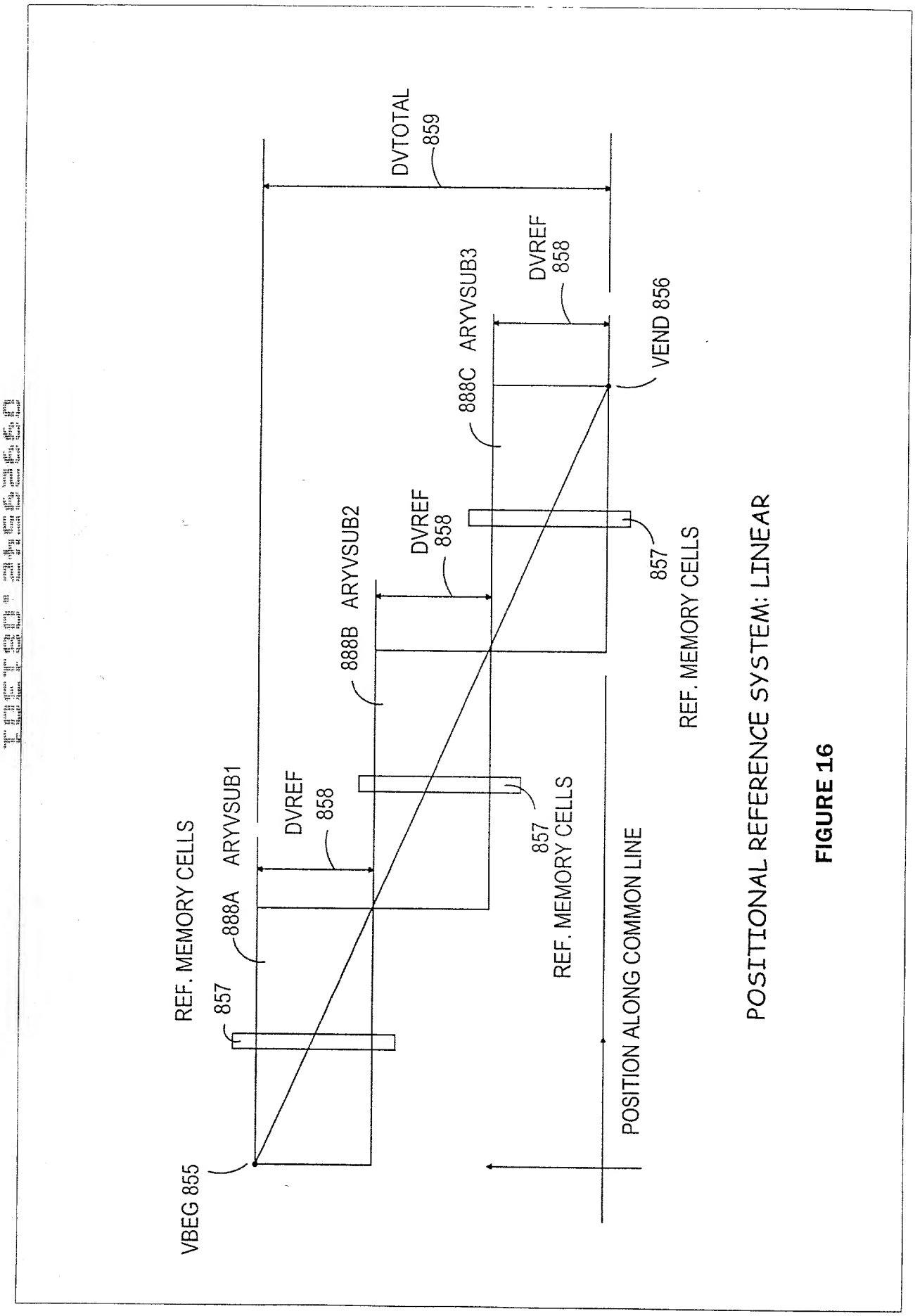
FIGURE 14

BLOCK DIAGRAM OF REFERENCE SYSTEM FOR SUPER HIGH DENSITY DIGITAL MULTILEVEL NON-VOLATILE MEMORY



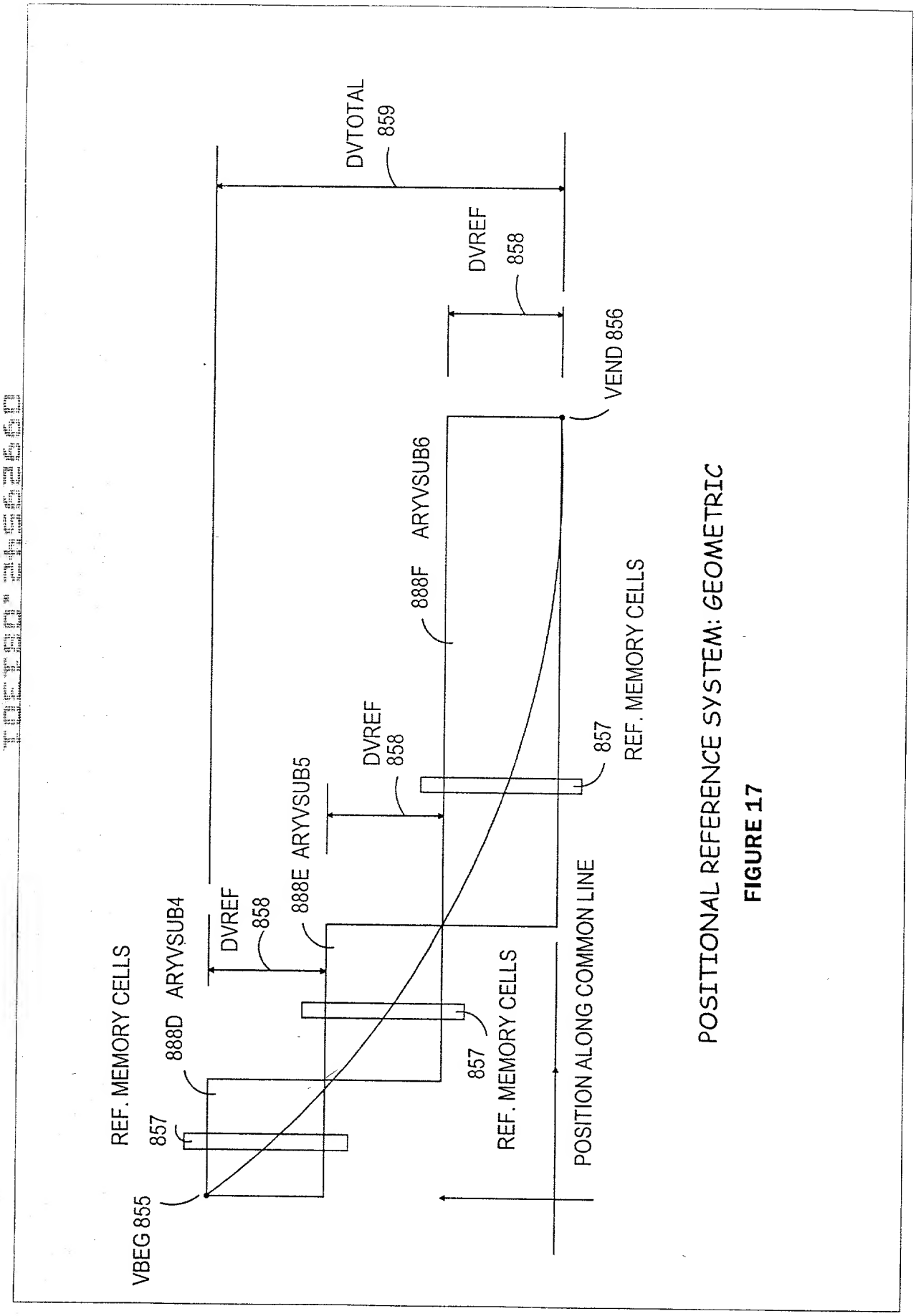
REFERENCE DETECTION

FIGURE 15



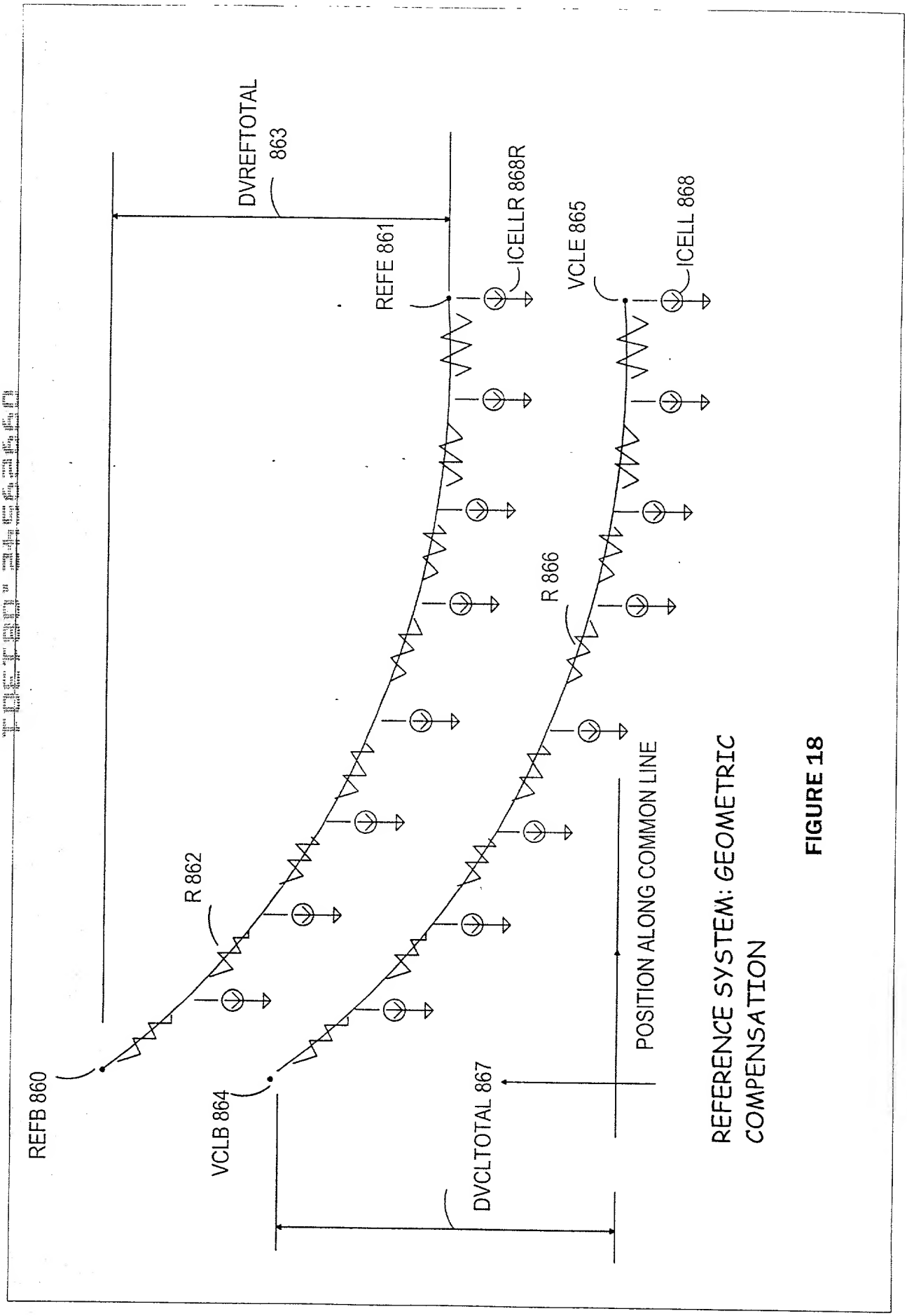
POSITIONAL REFERENCE SYSTEM: LINEAR

FIGURE 16



POSITIONAL REFERENCE SYSTEM: GEOMETRIC

FIGURE 17



REFERENCE SYSTEM: GEOMETRIC COMPENSATION

FIGURE 18

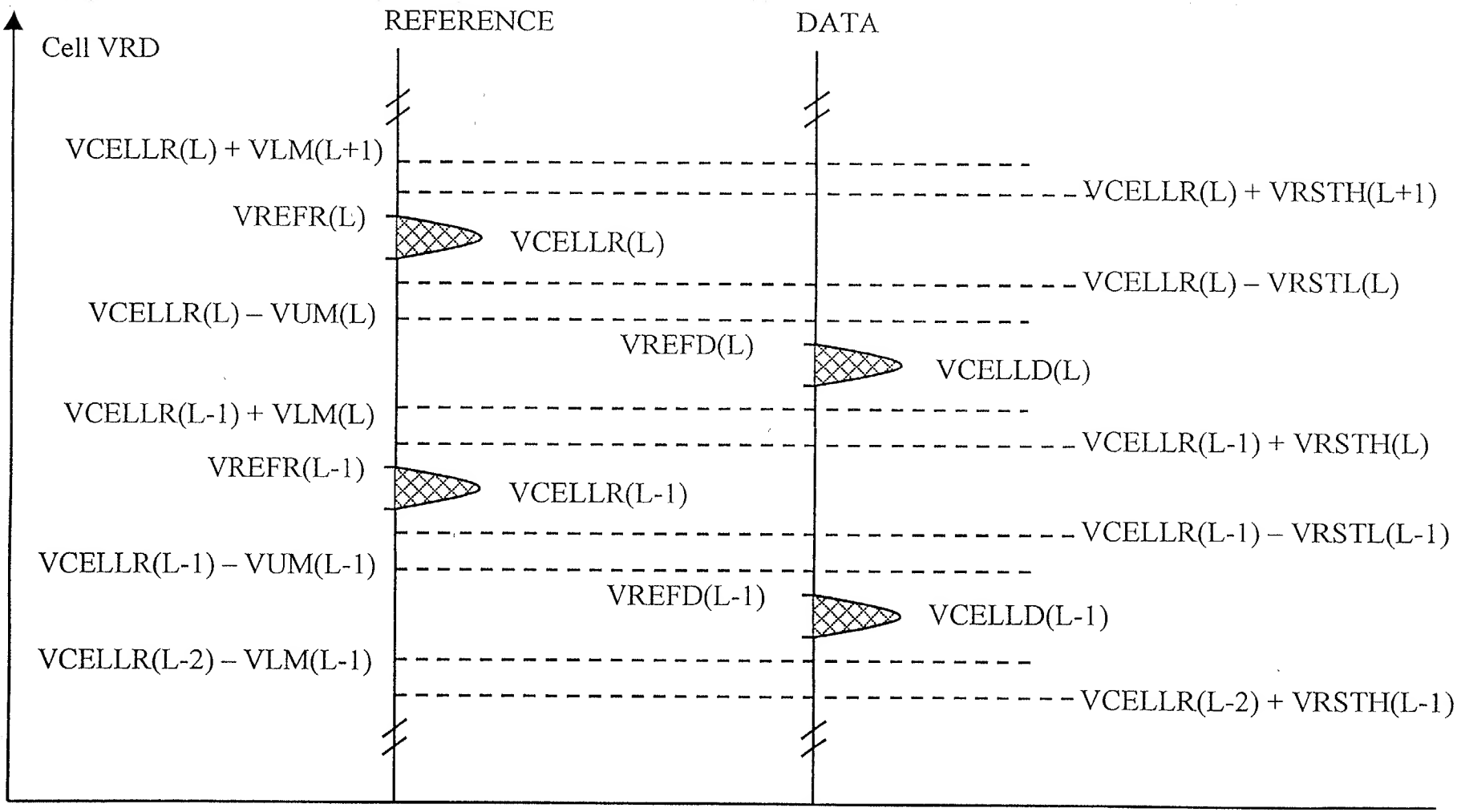

Cell VRD
REFERENCE
DATA
VCELLR(L) + VLM(L+1)
VREFR(L)
VCELLR(L)
VCELLR(L) – VUM(L)
VCELLR(L) + VRSTH(L+1)
VCELLR(L) – VRSTL(L)
VREFD(L)
VCELLD(L)
VCELLR(L-1) + VLM(L)
VREFR(L-1)
VCELLR(L-1)
VCELLR(L-1) + VRSTH(L)
VCELLR(L-1) – VRSTL(L-1)
VCELLR(L-1) – VUM(L-1)
VREFD(L-1)
VCELLD(L-1)
VCELLR(L-2) – VLM(L-1)
VCELLR(L-2) + VRSTH(L-1)

FIG._19A

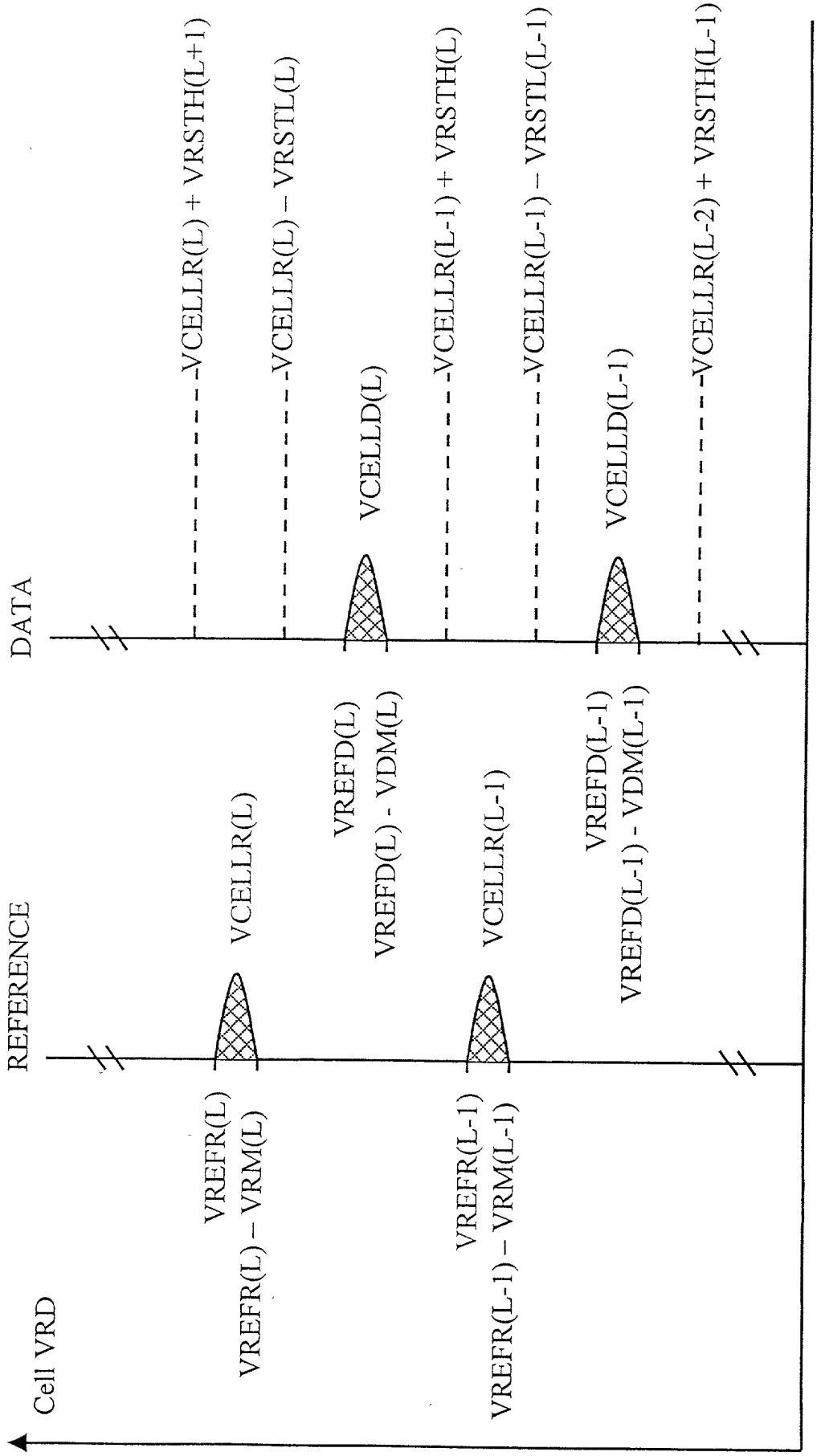

Cell VRD
REFERENCE
DATA
VREFR(L)
VREFR(L) – VRM(L)
VCELLR(L)
VREFD(L)
VREFD(L) - VDM(L)
VCELLD(L)
VREFR(L-1)
VREFR(L-1) – VRM(L-1)
VCELLR(L-1)
VREFD(L-1)
VREFD(L-1) - VDM(L-1)
VCELLD(L-1)
VCELLR(L) + VRSTH(L+1)
VCELLR(L) – VRSTL(L)
VCELLR(L-1) + VRSTH(L)
VCELLR(L-1) – VRSTL(L-1)
VCELLR(L-2) + VRSTH(L-1)

FIG._19B

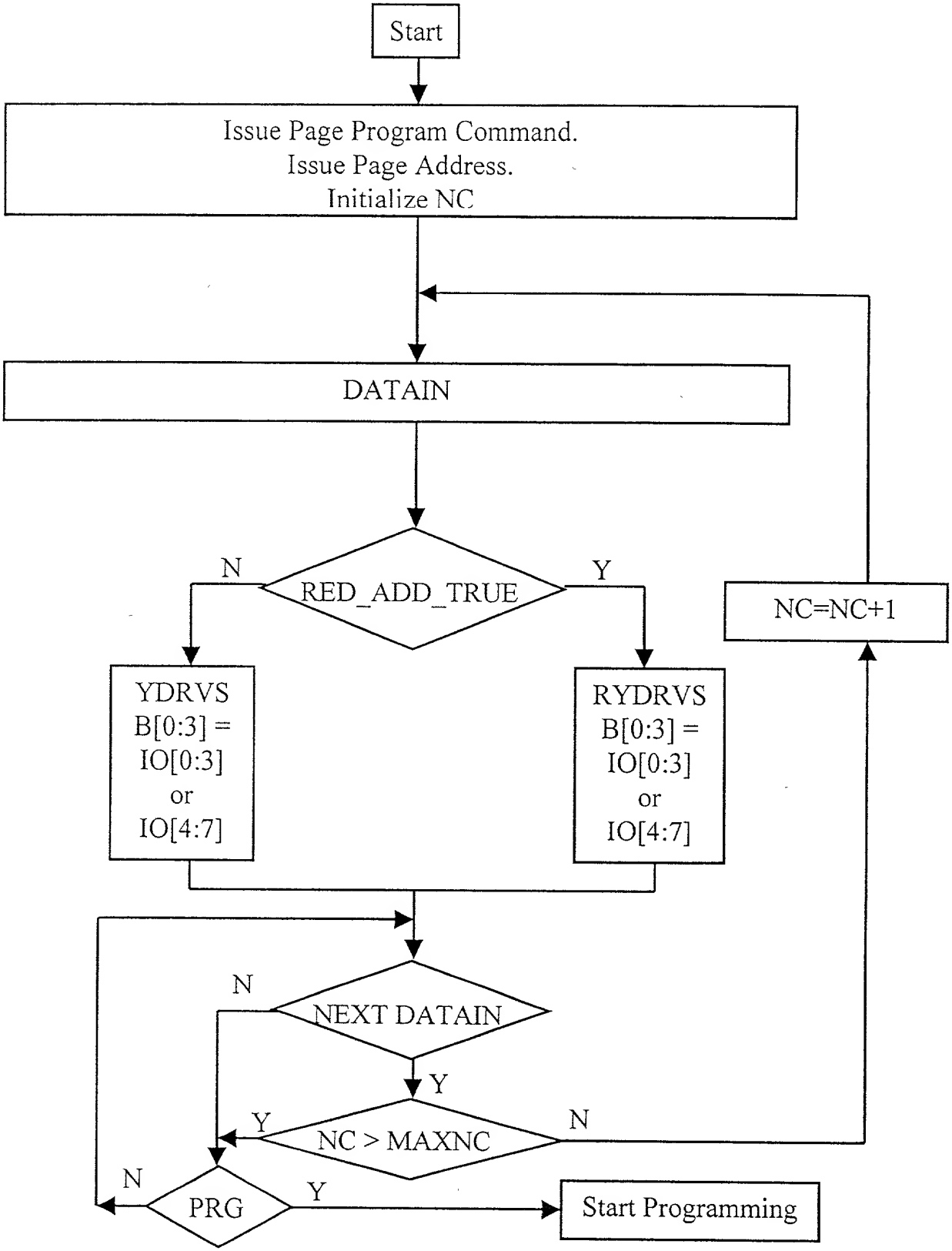

Start
Issue Page Program Command.
Issue Page Address.
Initialize NC
DATAIN
RED_ADD_TRUE
N
Y
YDRVS
B[0:3] =
IO[0:3]
or
IO[4:7]
RYDRVS
B[0:3] =
IO[0:3]
or
IO[4:7]
NC=NC+1
NEXT DATAIN
N
Y
NC > MAXNC
Y
N
PRG
N
Y
Start Programming

FIG._20

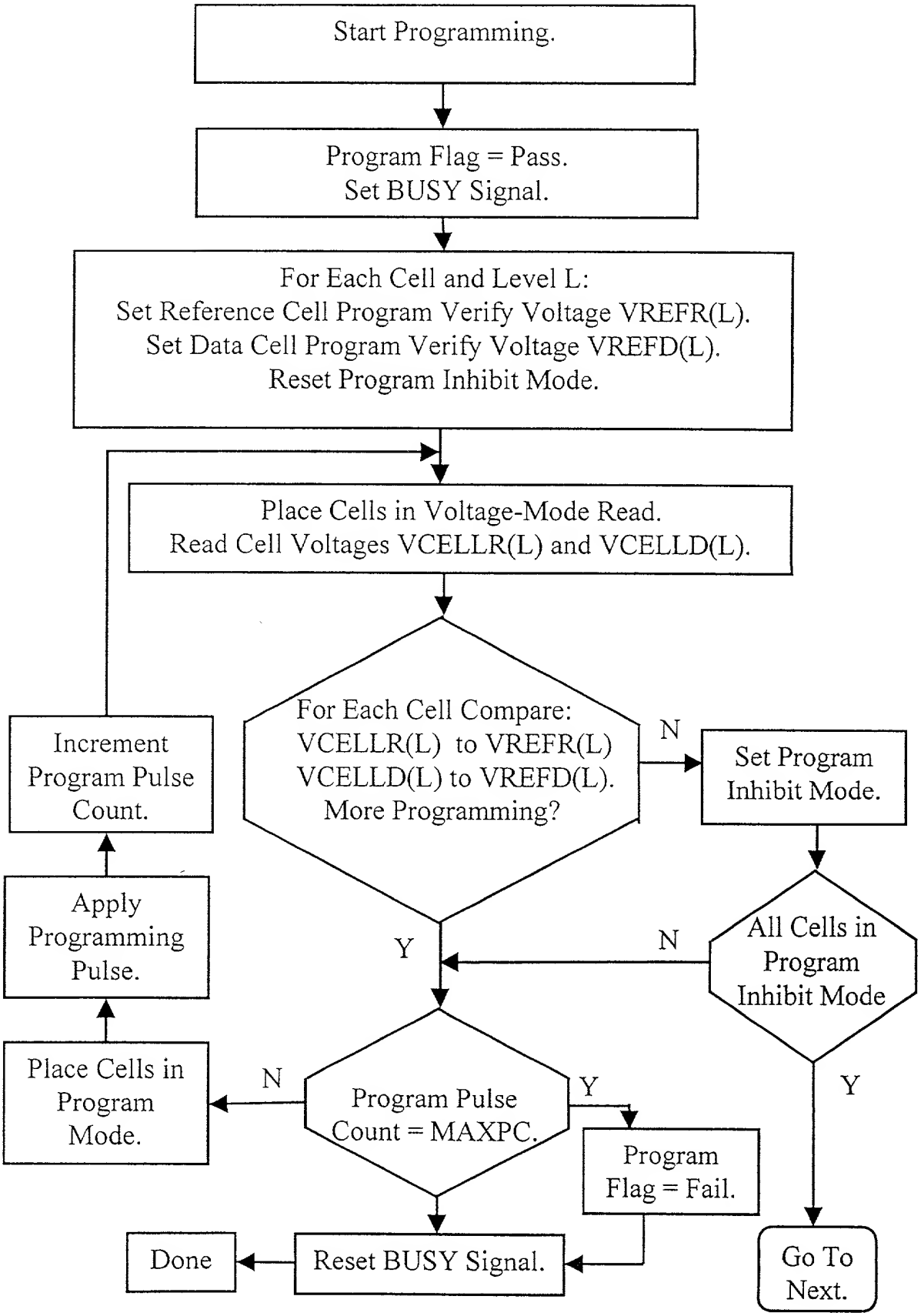

Start Programming.
Program Flag = Pass.
Set BUSY Signal.
For Each Cell and Level L:
Set Reference Cell Program Verify Voltage VREFR(L).
Set Data Cell Program Verify Voltage VREFD(L).
Reset Program Inhibit Mode.
Place Cells in Voltage-Mode Read.
Read Cell Voltages VCELLR(L) and VCELLD(L).
For Each Cell Compare:
VCELLR(L) to VREFR(L)
VCELLD(L) to VREFD(L).
More Programming?
N
Set Program Inhibit Mode.
All Cells in Program Inhibit Mode
N
Y
Y
Increment Program Pulse Count.
Apply Programming Pulse.
Place Cells in Program Mode.
N
Program Pulse Count = MAXPC.
Y
Program Flag = Fail.
Done
Reset BUSY Signal.
Go To Next.

FIG._21

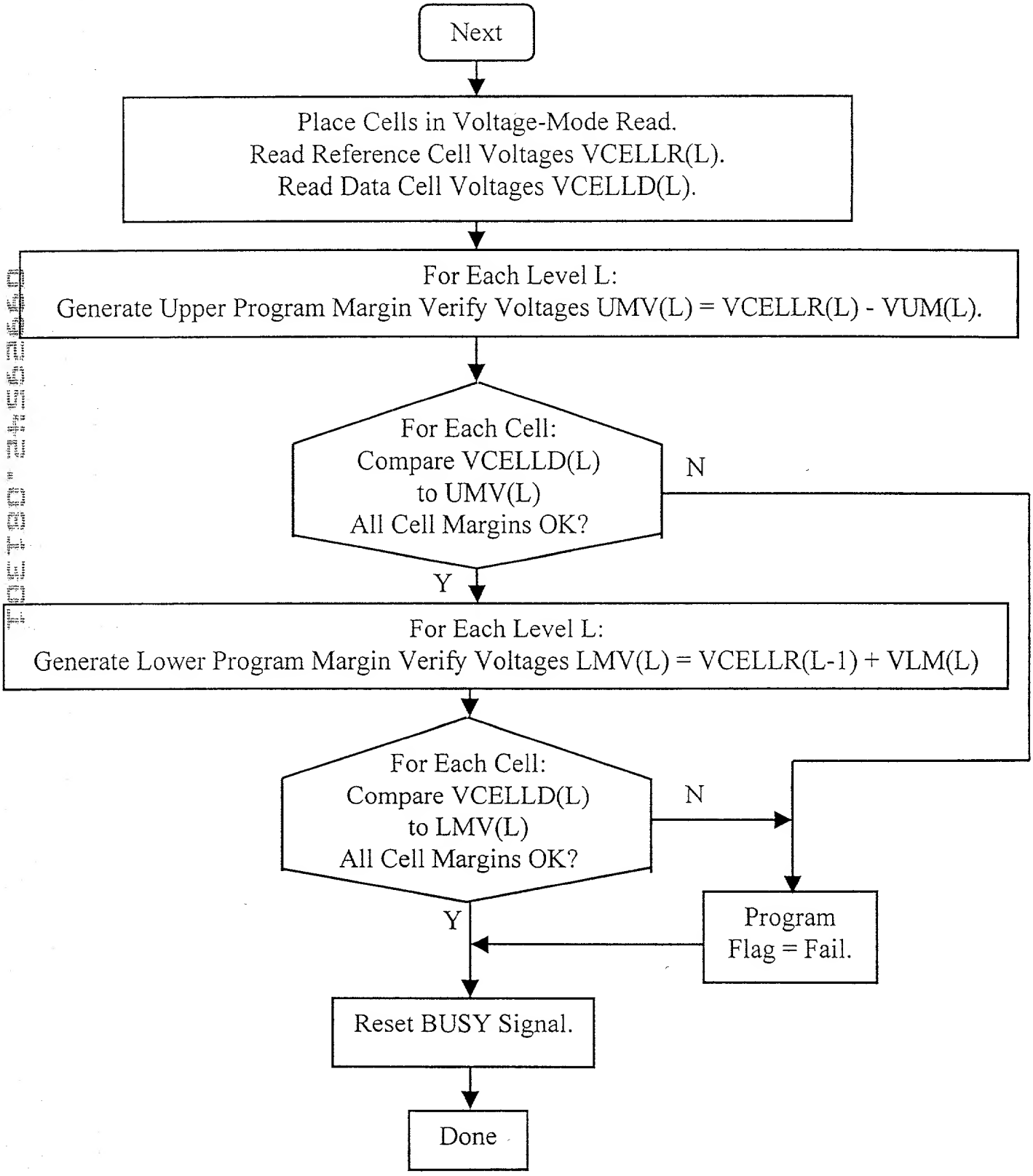

Next
Place Cells in Voltage-Mode Read.
Read Reference Cell Voltages VCELLR(L).
Read Data Cell Voltages VCELLD(L).
For Each Level L:
Generate Upper Program Margin Verify Voltages UMV(L) = VCELLR(L) - VUM(L).
For Each Cell:
Compare VCELLD(L)
to UMV(L)
All Cell Margins OK?
N
Y
For Each Level L:
Generate Lower Program Margin Verify Voltages LMV(L) = VCELLR(L-1) + VLM(L)
For Each Cell:
Compare VCELLD(L)
to LMV(L)
All Cell Margins OK?
N
Y
Program
Flag = Fail.
Reset BUSY Signal.
Done

Fig._22A

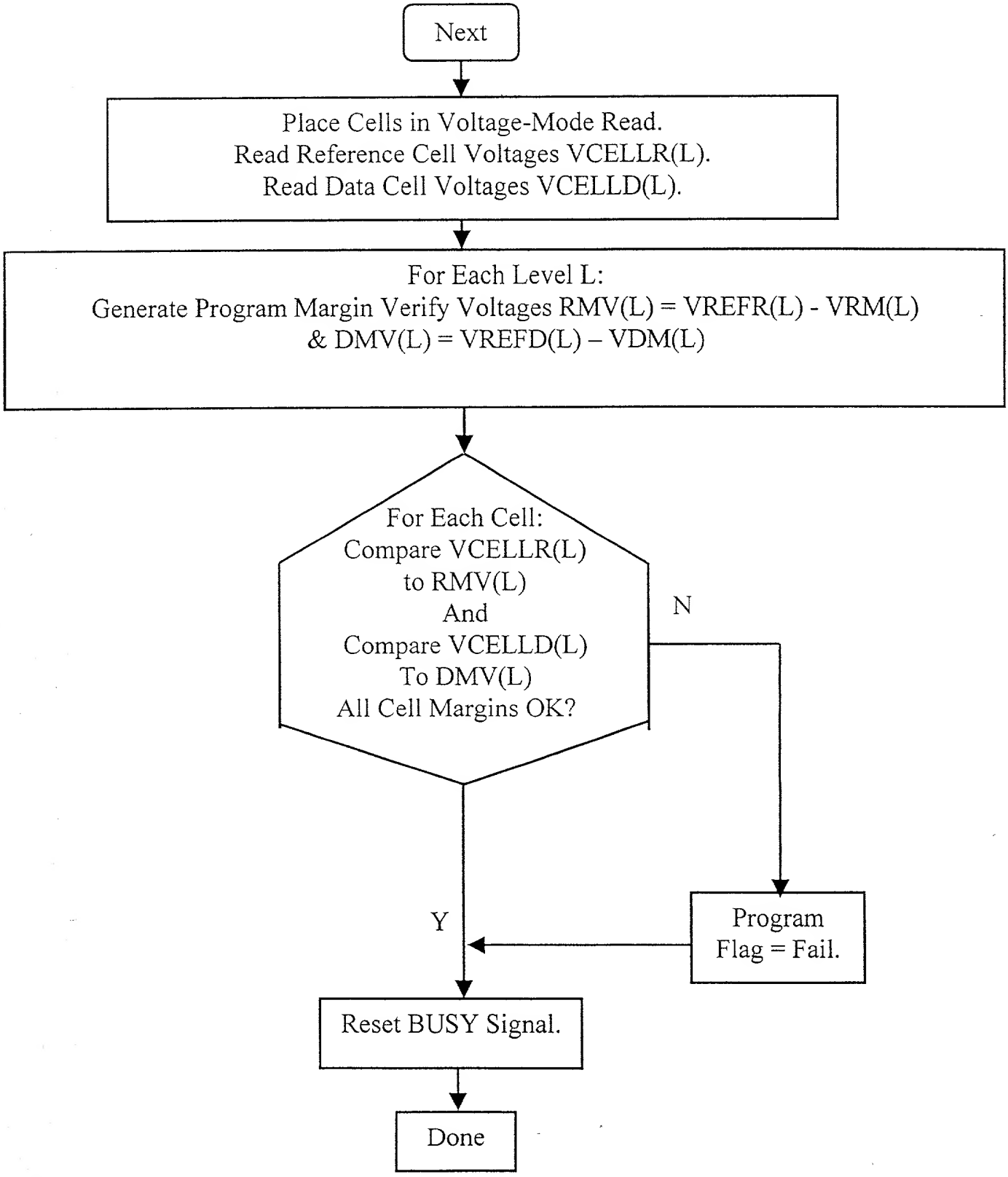

Next
Place Cells in Voltage-Mode Read.
Read Reference Cell Voltages VCELLR(L).
Read Data Cell Voltages VCELLD(L).
For Each Level L:
Generate Program Margin Verify Voltages RMV(L) = VREFR(L) - VRM(L)
& DMV(L) = VREFD(L) – VDM(L)
For Each Cell:
Compare VCELLR(L)
to RMV(L)
And
Compare VCELLD(L)
To DMV(L)
All Cell Margins OK?
N
Y
Program
Flag = Fail.
Reset BUSY Signal.
Done

Fig._22B

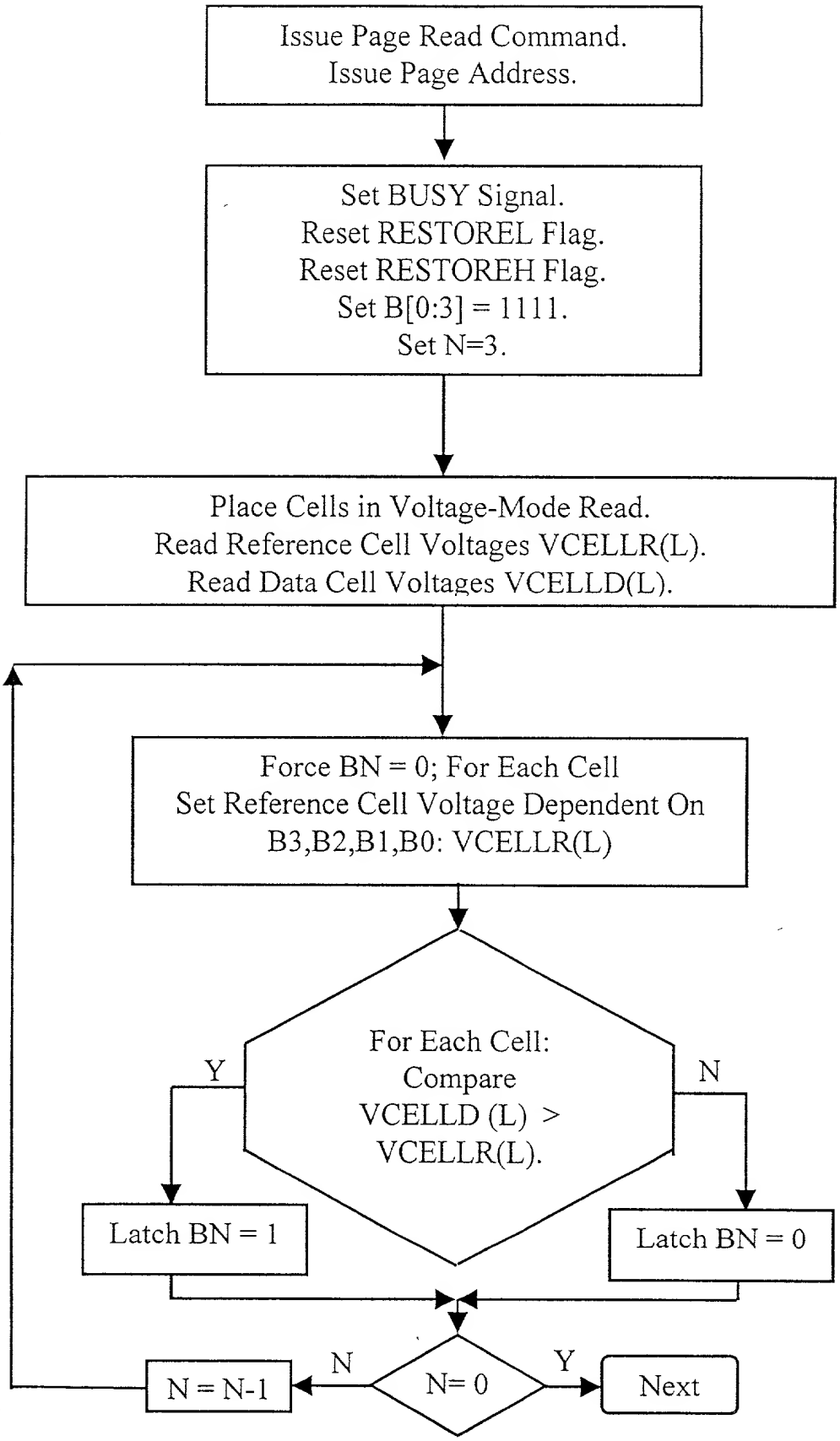

Issue Page Read Command.
Issue Page Address.
Set BUSY Signal.
Reset RESTOREL Flag.
Reset RESTOREH Flag.
Set B[0:3] = 1111.
Set N=3.
Place Cells in Voltage-Mode Read.
Read Reference Cell Voltages VCELLR(L).
Read Data Cell Voltages VCELLD(L).
Force BN = 0; For Each Cell
Set Reference Cell Voltage Dependent On
B3,B2,B1,B0: VCELLR(L)
For Each Cell:
Compare
VCELLD (L) >
VCELLR(L).
Y
N
Latch BN = 1
Latch BN = 0
N= 0
N
Y
N = N-1
Next

FIG._23

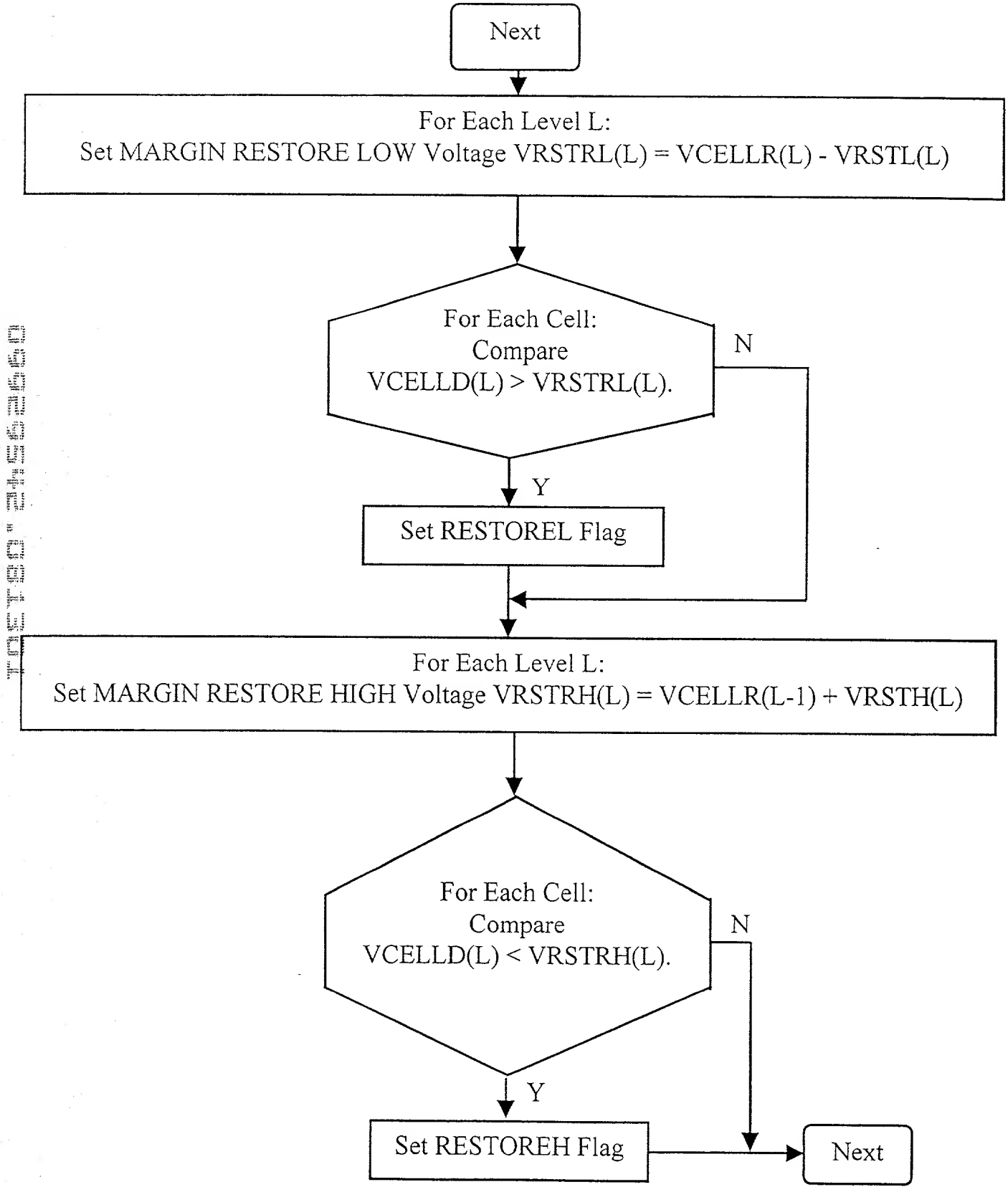

Next
For Each Level L:
Set MARGIN RESTORE LOW Voltage VRSTRL(L) = VCELLR(L) - VRSTL(L)
For Each Cell:
Compare
VCELLD(L) > VRSTRL(L).
N
Y
Set RESTOREL Flag
For Each Level L:
Set MARGIN RESTORE HIGH Voltage VRSTRH(L) = VCELLR(L-1) + VRSTH(L)
For Each Cell:
Compare
VCELLD(L) < VRSTRH(L).
N
Y
Set RESTOREH Flag
Next

FIG._24

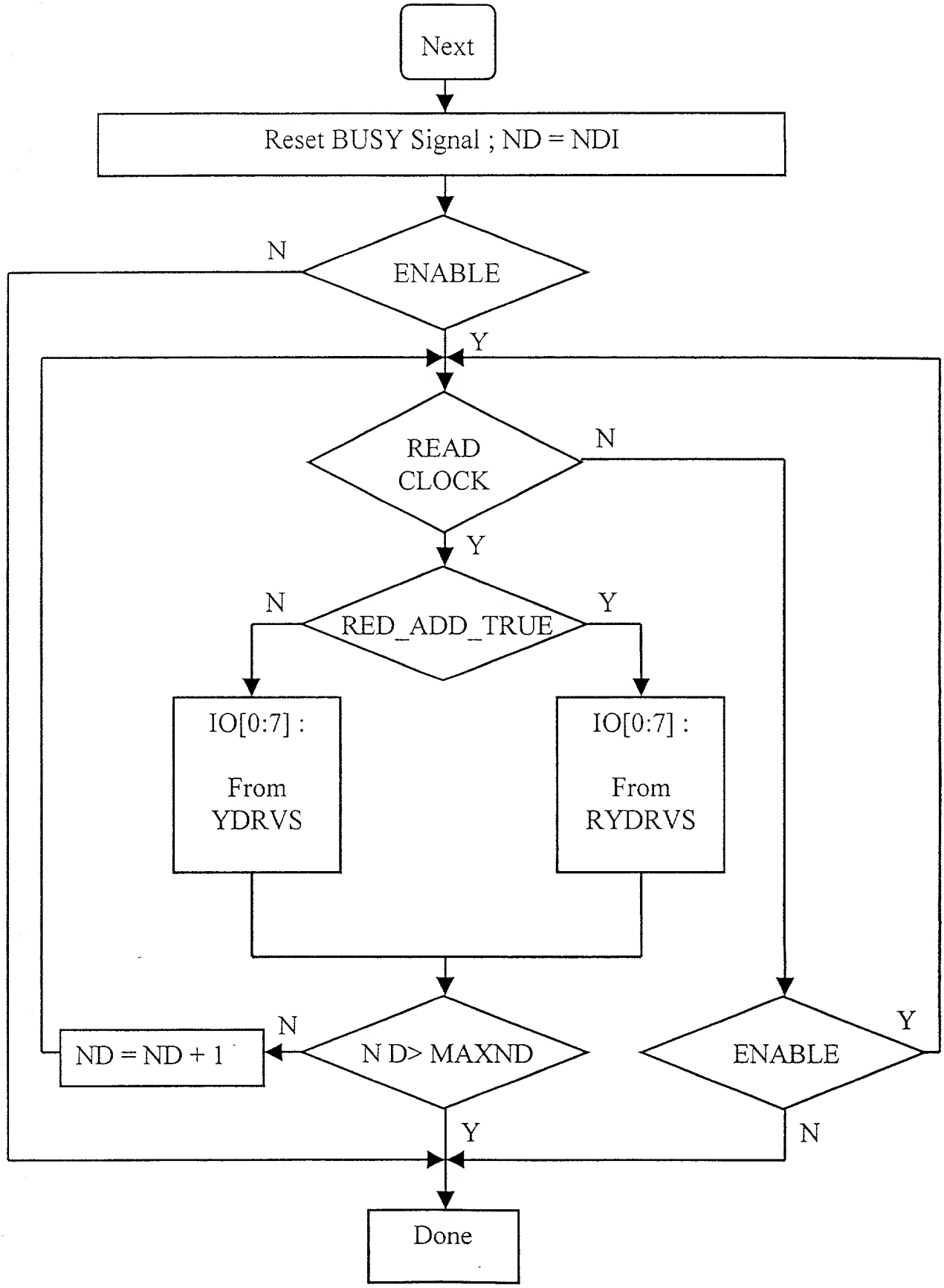

Next
Reset BUSY Signal ; ND = NDI
ENABLE
N
Y
READ CLOCK
N
Y
RED_ADD_TRUE
N
Y
IO[0:7] : From YDRVS
IO[0:7] : From RYDRVS
N D> MAXND
N
ND = ND + 1
ENABLE
Y
N
Y
Done

FIG._25

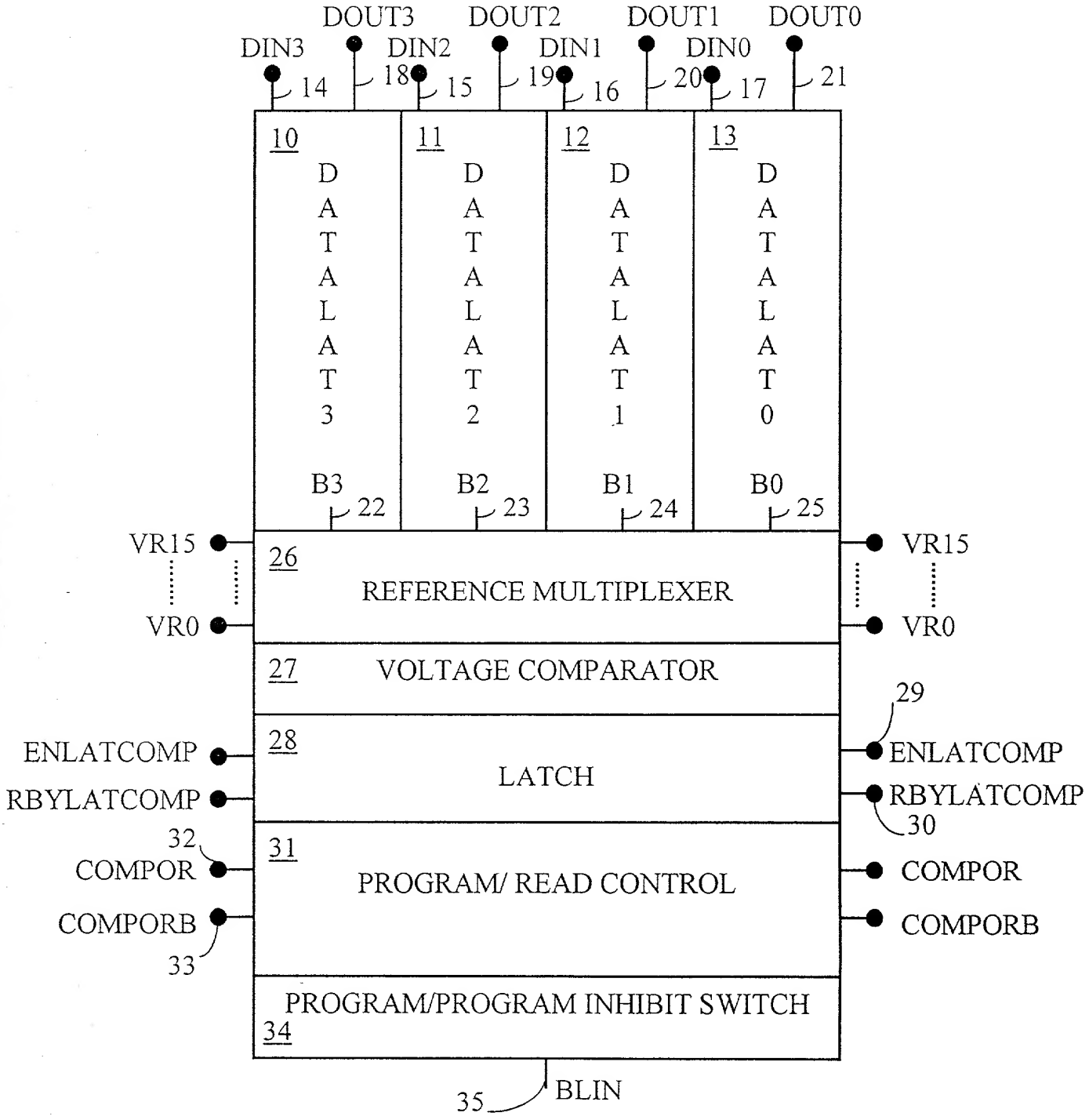

DOUT3
DOUT2
DOUT1
DOUT0
DIN3
DIN2
DIN1
DIN0
14
18
15
19
16
20
17
21
10
11
12
13
DATALAT3
DATALAT2
DATALAT1
DATALAT0
B3
B2
B1
B0
22
23
24
25
VR15
VR0
26
REFERENCE MULTIPLEXER
27
VOLTAGE COMPARATOR
29
28
ENLATCOMP
RBYLATCOMP
LATCH
30
32
31
COMPOR
COMPORB
PROGRAM/ READ CONTROL
33
34
PROGRAM/PROGRAM INHIBIT SWITCH
35
BLIN

Fig._26

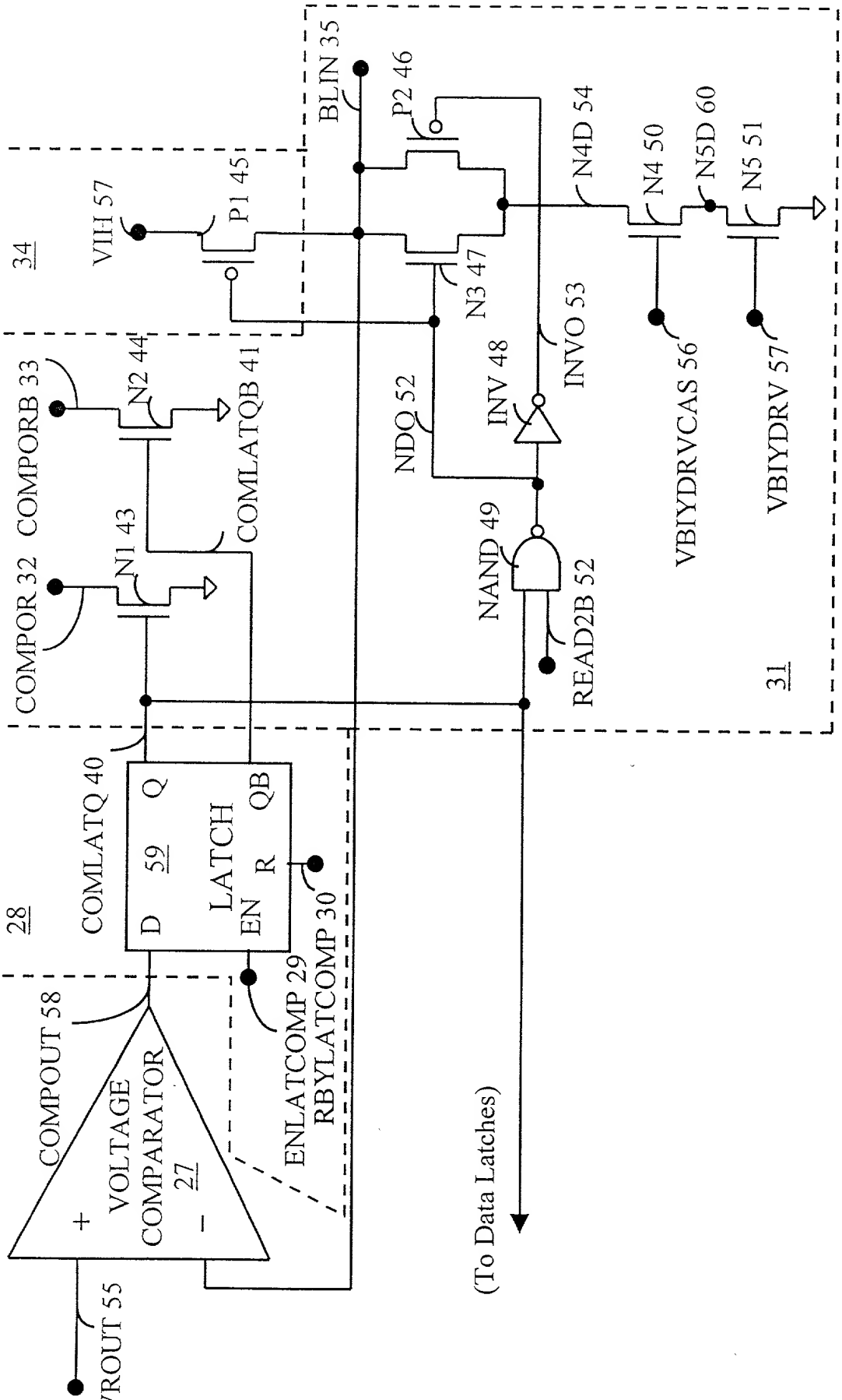

VROUT 55
VOLTAGE COMPARATOR 27
+
–
COMPOUT 58
ENLATCOMP 29
RBYLATCOMP 30
28
COMLATQ 40
LATCH
D 59 Q
EN R QB
COMPOR 32
COMPORB 33
N1 43
N2 44
COMLATQB 41
31
34
VIH 57
P1 45
BLIN 35
P2 46
N3 47
NDQ 52
INV 48
INVO 53
N4D 54
N4 50
N5D 60
N5 51
NAND 49
READ2B 52
VBIYDRVCAS 56
VBIYDRV 57
(To Data Latches)

Fig._27